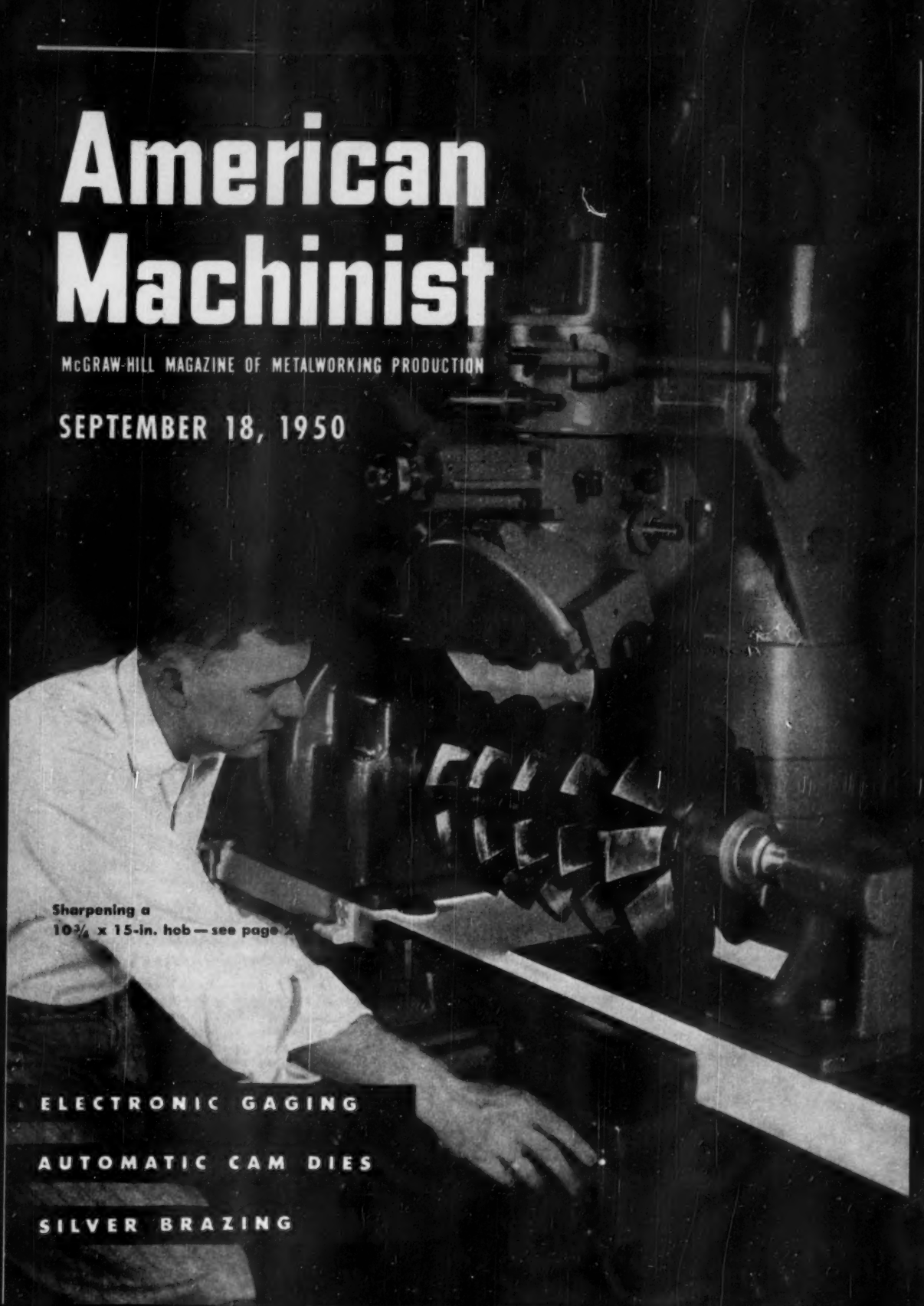
American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

SEPTEMBER 18, 1950



Sharpening a 10¾ x 15-in. hob — see page

ELECTRONIC GAGING

AUTOMATIC CAM DIES

SILVER BRAZING

split-seconds pay off in precision finishing, too!

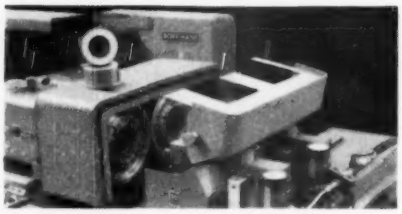
A fraction of a second can lose a race. Or win it. This is also true in the competitive race for higher production and lower costs.

If, for example, you could save even a fraction of a second on each motion that goes to make up a complete machine cycle, you would actually save many valuable seconds per part — seconds that add up to minutes per hour, hours per day or week.

In the new line of Heald Bore-Matics and Grinders, split-second timing of every motion has resulted in *faster cycles* — and faster, easier production than ever before.

Faster rapid table traverse, quicker starts and stops, automatic operations, more efficient loading and unloading, easier set-ups — all combine to give you the greatest possible production economy.

Remember, when it comes to precision finishing, it pays to come to Heald.



New, Faster, Heald Bore-Matic increases rotor assembly production 100%!

Faster operation and automatic cycling enabled this new Heald Model 221 Bore-Matic to double production rates for finish borizing the I.D.'s of rotor assemblies. Two parts are finished simultaneously, in a two-station setup with double diaphragm chucks. Tooling is carried on a double dial boring bar arrangement with provision for automatic indexing at end of boring stroke to eliminate drag lines during retraction.

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

HEALD

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York

To Meet the Problem of "EXTREMELY SEVERE USAGE" Chris-Craft specifies MEEHANITE® CASTINGS

Fig. 2

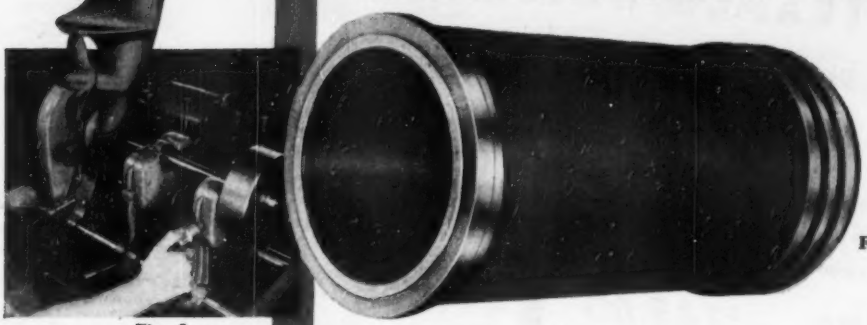


Fig. 1

Fig. 3

The problems of severe wear are an everpresent challenge to both the specifier and producer of materials. So as to provide real durability and maximum wear resistance under what Chris-Craft describe as conditions of extremely "severe usage", Meehanite castings are used for the cylinder liners (*Fig. 1*) in their new line of outboard motors (*Fig. 2*). The liner itself is subjected to precision machining and as a result must be truly flawless in every sense. Furthermore, the metal structure must provide the proper combination and constitution necessary to resist the constant high-speed rubbing action of the pistons. Because the Meehanite processes permit accurate regulation and control of metal structure these important parts are specified as Meehanite castings.

In addition, the outboard flywheel (*Fig. 3*) is a Meehanite casting which must be carefully machined to an accurate balance and also retain a truly dimensional stability.

The manufacture of high-quality Meehanite castings accurately produced to provide you with the correct combination of engineering characteristics for your job is the daily function of the foundries listed below.

Take Your Casting Problems To A MEEHANITE Foundry!

American Brake Shoe Co.	Mahwah, New Jersey
The American Laundry Machinery Co.	Rochester, New York
Atlas Foundry Co.	Detroit, Michigan
Banner Iron Works	St. Louis, Missouri
Barnett Foundry & Machine Co.	Irvington, New Jersey
E. W. Bliss Co.	Hastings, Mich. and Toledo, O.
Builders Iron Foundry, Inc.	Providence, Rhode Island
Continental Gin Co.	Birmingham, Alabama
The Cooper-Bessemer Corp.	Mt. Vernon, Ohio and Grove City, Pa.
Farrel-Birmingham Co., Inc.	Ansonia, Connecticut
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Vulcan Foundry Co.	Oakland, California
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"This advertisement sponsored by foundries listed above."

MEEHANITE® PERSHING SQUARE BUILDING · NEW ROCHELLE, N. Y.

MAKES 4 SAVINGS ON 1 JOB* — simply by changing to TEXACO SULTEX CUTTING OIL

1 LESS DOWNTIME

(@ $5 per hour charged against machine)

Cost with Oil previously used	$280.00
Cost with Texaco Sultex Cutting Oil	35.00
SAVING	$245.00 per month

2 GREATER OUTPUT

Texaco Sultex Cutting Oil	11,592
Oil previously used	8,064
INCREASE	3,528 pieces per month

3 LESS SCRAP

Oil previously used	1,344
Texaco Sultex Cutting Oil	168
REDUCTION	1,176 pieces per month

4 LONGER TOOL LIFE

Oil previously used	168
Texaco Sultex Cutting Oil	21
SAVING	147 regrinds per month

● The above savings were made on just one machine – but they are typical of Texaco savings in plants everywhere. You can do all your machining jobs faster, better and at lower cost with Texaco.

There is a complete line of Texaco Cutting, Grinding and Soluble Oils designed to meet every machining need. A Texaco Lubrication Engineer will gladly prove it to you. Just call the nearest of more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, New York.

*Name of this Texaco user on request

TEXACO

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American Machinist

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CONTENTS for SEPTEMBER 18, 1950

VOL. 94, NO. 19

Cover ..... *Operation pictured is described on page 2*

ADMINISTRATION

Editorial ..... *Burnham Finney* 93
Small Crane Handles Big Training Job 103
What Price Employee Morale? ..... *A. M. Elliott* 122
Head Beats Hands ..... *Round Table* 126

SPECIAL REPORT

How to Cut Costs with Cutting Fluids ..... *E. J. Tangerman* 109

INSPECTION

Electronic Gages Solve Various Problems ..... *David Fidelman* 95
New Process Checks Hardness Electronically .. *Chester S. Ricker* 118
Swiveling Gage Members for Hidden Bores ..... *L. O. Blackstone* 130
Electric Circuit Testers Prevent Shock Hazard ..... *Fred Lettino* 131

ASSEMBLY & REPAIR

6 Steps to Better Silver Brazing ..... *Roger Metzler* 100
Iron Cement and Bolts Seal Weak Casting ..... *C. A. Gilson* 128
Resistance Welding Applications ..... *R. T. Gillette (RBS)* 135

MATERIALS HANDLING

Parts Conveyor Cuts Plant Congestion ..... *Fred R. Worley* 127

MATERIAL CUTTING, FORMING

Detailed Estimates for Automatics ..... *Herbert C. Lindberg* 104
Transfer Presses Handle Non-Concentric Work ..... *John Verson* 121
Engine-Lathe Setup Turns Accurate Ellipse ..... *H. R. Gilliam* 128
Special Countersink Burrs Hidden Edges ..... *Robert Long* 129
Torque Brake Cuts Chatter on Old Boring Mill ... *H. G. Frommer* 129
Edge Grinding Finishes Cams Smooth and Square *Joseph J. Sanzo* 130
Polish Starts with Limestone ..... *L. W. Court* 117
Small Polishing Wheel Clamped with Dog ..... *E. F. Wallendorf* 131
Holes Punched with Previously Cut Slug *Kenneth L. Stoltenberg* 132

TOOLING

Punch-Press Tooling Works from Cams Makes Cams *J. H. Tomlin* 106
Talented Tooling 124
Expanding Chuck Grips Thin Aluminum Rings .... *W. M. Halliday* 128
Large T-Handle Has Threaded Collar .... *R. B. Wolverhampton* 129
Tap Extension Holds Tight ..... *Gordon Allen* 130
Tapholder Has One Moving Jaw .... *Frank M. Butrick, Jr.* 131
Pin Vise in Tailstock Drills Tiny Holes ..... *Bernard D. Campbell* 132

NEWS OF METALWORKING

Spot News 81
Washington 83
Detroit News 85
New Tooling 87
Gaging Metalworking 90
Names in the News 146

DEPARTMENTS

Backlash 74
Reference Book Sheets .. 135
Talking Shop 141
Equipment Materials Parts 148
Free Literature Available .. 157
Round Table Discussion ... 170

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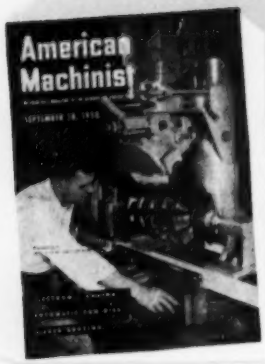


Chips and QUIPS

Unusual Hob . . . A 1-DP hob, 10¾ in. by 15-in. face width, for the Brazilian Navy, is Kodachromed for our cover during sharpening. The machine is a Barber-Colman No. 10-12 hob sharpener.

Cutting Fluids . . . Machine tool and tooling are vital in cutting production costs. Just as vital, in many cases—but usually neglected—is proper choice and handling of coolant. Little dependable information on cutting fluids has been published; most shop men have been forced to haphazard choice or semi-blind cut-and-try. To point a way out of the fog, our current 8-page Special Report brings some authentic and independent research on coolants, with complete details of methods of testing and study. To prove such study pays, one user reports a cut of 48% in part-machining cost gained by test and proper choice of cutting fluid *alone!* Here are some signposts for you on the road to saving machining dollars.

Silver Seams . . . We've had a number of articles in the past on brazing, including brazing with silver. For a miniature primer on silver-alloy brazing we went straight to the horse's mouth—Roger Metzler of Handy & Harmon, who manufacture the alloys. H & H experience with customers' problems are the basis for new factual data on the process.

Electronics . . . Gaging with electronic tubes—or 'valves', as the British call them—is a coming science. For the basic data and explanations of how widely and how well electronics can be applied in gaging, David Fidelman presents a general discussion and sample circuit diagrams. For the case-study side of electronics, Chester Ricker, our Motor City Editor, has a story on non-destructive hardness testing of heat-treated parts—no human errors involved.

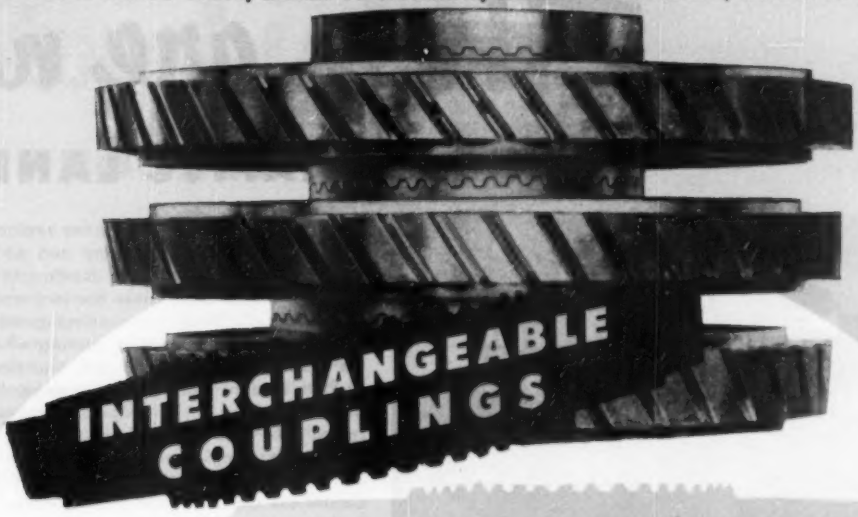
Big Movement . . . In line with our constant effort toward better training programs for industry, we have another short on how Armco trains crane handlers. Instead of turning the new men loose on a full-sized crane, with which they might easily bash a few heads, Armco has an exact scale model on which techniques are demonstrated. It saves wear and tear on expensive equipment—not to mention manpower.

Morale . . . Besides short articles on transfer presses with automatic stack feed, a parts conveyor that keeps plant aisles uncluttered, our popular Talented Tooling feature with tips to tool designers, and our Reference Book Sheets (projection-welding applications this time), we have a 2-pager on the human factor: employee morale. More and more important are the factors that keep personnel happy—and the good plant executive is the one who can combine ability to handle men and technical problems. The article by A. M. Elliott shows that dignity, comfort, and consideration are often more important than a nickel raise.

Coming . . . Oct. 2 *AM* has a Special Report on a subject that has gradually edged out of the mysterious-skill stage to become one of the important production processes—lapping. There's a lot of material on equipment in the issue—articles on the rigidity of machine tools and on how to get the most out of turret lathes. Shorter articles cover such subjects as feeds for forming dies, cam standards, stacking chutes that simplify materials handling at presses, a 16-step method for gas-welding piston-ring carriers to pistons, and a spread of Shop Shots. In line with our campaign to promote optimum machining speeds, there's an article showing that you can't *afford* to stick to slow speeds.

IDEA MAN . . . E. J. Tangerman, newly appointed executive editor of *American Machinist*, has been around the office for 21 years since he put himself through Purdue "with distinction" by an extensive mechinist's apprenticeship. He has been an idea man in many capacities for a number of McGraw-Hill magazines. For the past five years he has been managing editor of *American Machinist* where he has been the spark plug behind many a major story. His interest in the possibilities of high-speed machining has led to a series of articles that has probably aroused more interest in the metalworking industry than any series since Fred Colvin gave the first reports of Ford's production methods nearly 30 years ago. This interest has led Tange into the problems posed by cutting fluids and he comes up with another timely and important report in this issue.

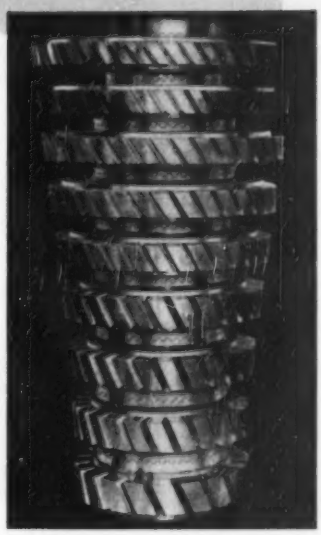
TO MAKE LARGE UNITS, EASIER TO MACHINE, EASIER TO ASSEMBLE, EASIER TO REPLACE

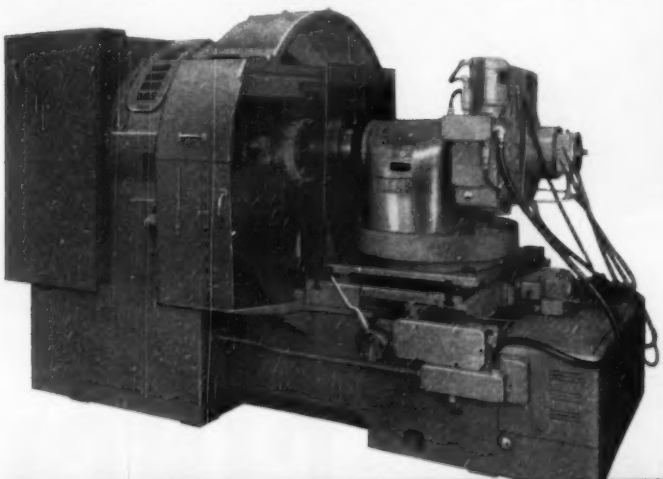


GROUND FROM THE SOLID

WITH THE GLEASON NO. 19 CURVIC COUPLING GRINDER

Built-up units employing the principle of the permanent coupling provide a simplified self-centering means of assembly. The teeth of such a unit carry the torque load. Individual parts are manufactured in high production quantities at low cost—held to the extremely close tolerances so vitally necessary in this type of application—and accurately balanced. In addition, interchangeable units allow "in the field" maintenance. In turbines, for example, such as the compressor rotor for an aircraft gas turbine engine shown here, the fixed coupling teeth between each stage join these sections with perfect alignment.





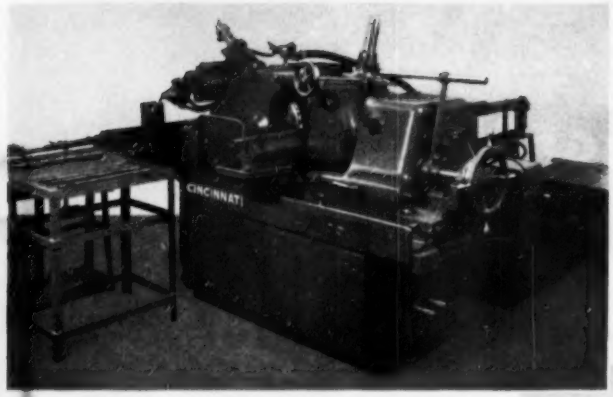
Write for "Gleason Curvic Couplings" which illustrates many of the various types of clutches and couplings capable of being produced on the Gleason No. 19 Curvic Grinder.

GLEASON Works
1000 University Avenue
Rochester 3, N. Y., U. S. A.

Builders of Bevel Gear Machinery for Over 85 Years

There are no

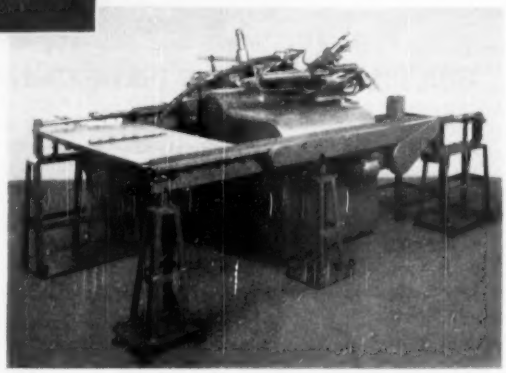
IN THESE TRAFFIC LANES

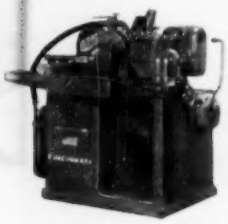


Idea for your centerless grinder replacement program: eliminate stop and go of production; keep the work moving in a one-way traffic lane. There are two ways to do this: 1) With a centerless grinder that runs for years without quitting when the going gets tough or too exacting. 2) With modern tooling, like the examples illustrated here . . . U-shaped conveyors return the work to the front of the machine. (Trucking space behind the machine eliminated.) ¶ CINCINNATI FILMATIC Centerless Grinders offer a high value of performance which will meet all your

Surface finish unmarked, the work returns to the operator at the front of this CINCINNATI FILMATIC No. 2 Centerless Grinder. Front and rear views, showing power conveyor equipment at the exit side of the wheels and rear of the machine. Equipment includes type A Long Bar Fixture.

Part name	Fluted textile roll
Material	Steel
Operation	Lap grind fluted diameter
Finish produced	15 micro-inch max.
Production	200 per hour





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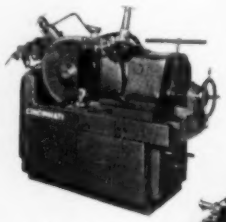

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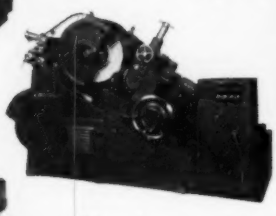

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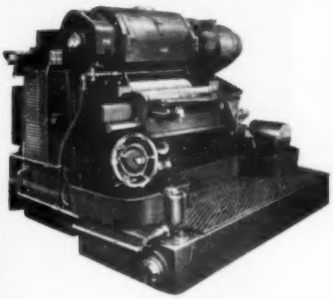


The CINCINNATI FILMATIC Centerless Line

Write for these catalogs:

No. 0: Publication No. G-576-1

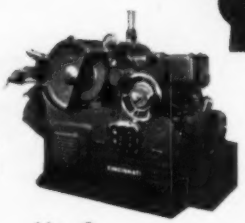
No. 2: Publication No. G-591

No. 3: Publication No. G-570-1

No. 4: Publication No. G-538-1

No. 5: Data on request

No. 6: Data on request



No. 3

CINCIN

Stop Lights

OF PRODUCTION

requirements. FILMATIC grinding wheel spindle bearings, an exclusive Cincinnati feature, require no adjustment for any grinding condition; they'll not quit when the going gets tough. Cincinnati Application Engineers, experienced in centerless grinding problems since the very beginning of the centerless era, will handle the tooling for you. ¶You can't go wrong in choosing CINCINNATI all the way; CINCINNATI FILMATIC Centerless Grinders with tooling by Cincinnati Application Engineers. May we hear from you?

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

CINCINNATI

FILMATIC

Centerless ground sleeves return to the operator at the front of this CINCINNATI FILMATIC No. 3 Centerless Grinder.

Part name	Vacuum pump drive sleeve
Material	Steel
Operation	Grind O.D.
Stock removal .	.022" in three passes
Finish	Good commercial
Production	470 per hour per pass

REPLACE WITH A *NEW* CINCINNATI

NATI

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

GEAR SHAPERS
SHAVING MACHINES
THREAD GENERATORS
CUTTERS AND SHAVING TOOLS
GEAR-INSPECTION INSTRUMENTS
GRINDING MACHINES

It's DOLLARS you'd be *Shaving...*

Consider the seconds saved, the operating ease and tool-life economy of Fellows "Full Tool" Shaving! We'd be glad to tell you where you can see Fellows No. 8 "Full Tool" Shaving Machines doing their daily job of shaving dollars, out of the costs of gear finishing.

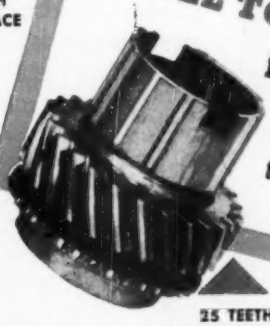
You may not have gears of the exact characteristics of the 9.4334/10 normal pitch, 32° helix angle gears below. But your time savings will be in direct relation.

The angular tool application of Fellows "Full Tool" method utilizes higher reciprocating speeds and provides exceptionally free cutting with greater accuracy. Cost wise, there is substantially less tool wear, and much longer tool life between resharpenings. That saves real dollars!

For time and cost estimates, or for descriptive literature, get in touch with the nearest Fellows Office listed below.

34 TEETH
27/32" FACE

"FULL TOOL" SHAVED in 28 seconds each
to lead limits of ±.0002"
to involute limits .0 to +.0004"

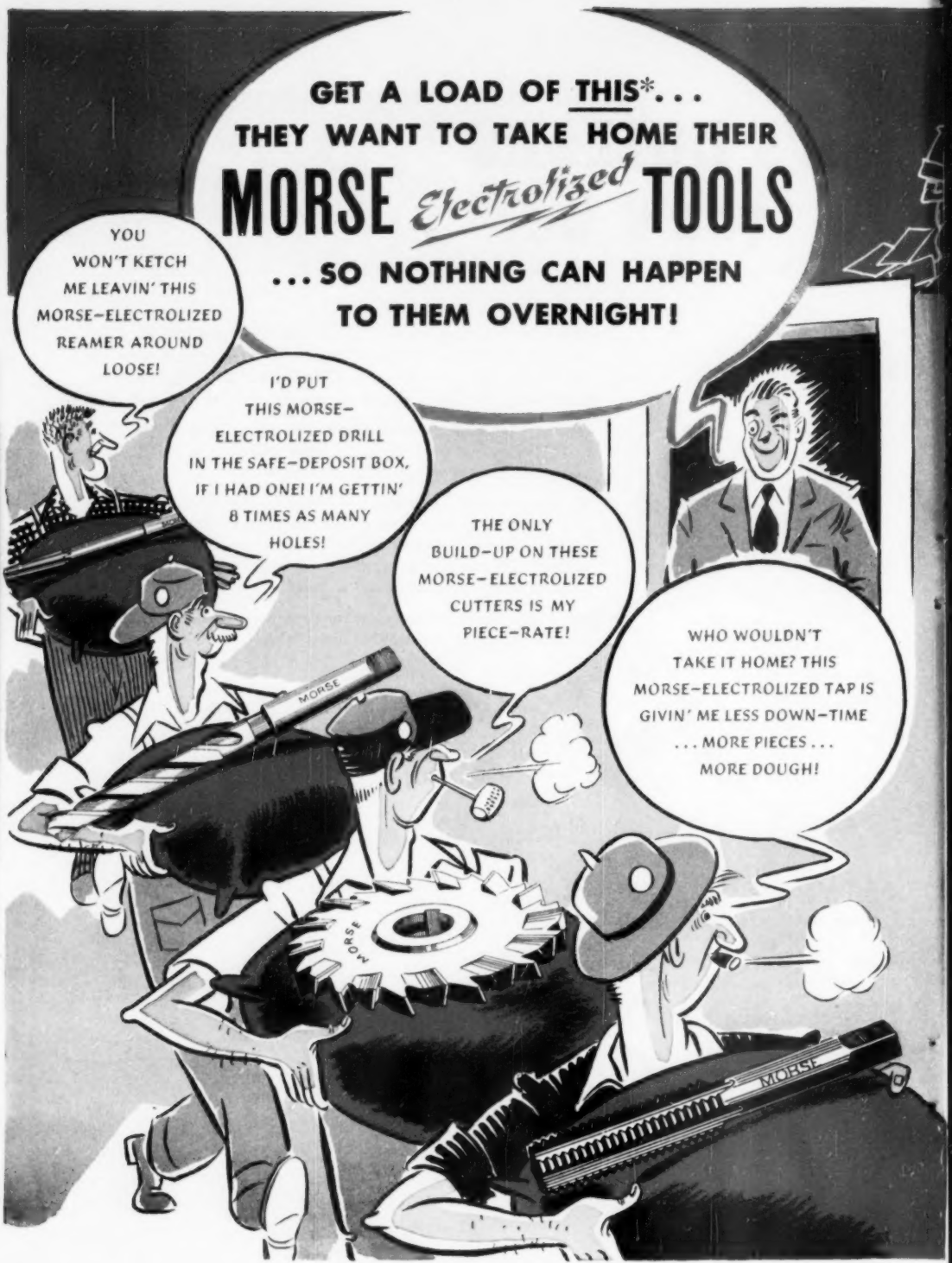


25 TEETH
13/16" FACE

27 TEETH
13/16" FACE

Fellows

THE FELLOWS GEAR SHAPER COMPANY • Head Office and Export Department • 78 River Street, Springfield, Vermont
Branch Offices: 616 Fisher Bldg., Detroit 2 • 640 West Town Office Bldg., Chicago 12 • 7706 Empire State Bldg., New York 1.


GET A LOAD OF THIS*...
THEY WANT TO TAKE HOME THEIR
MORSE Electrolized TOOLS
...SO NOTHING CAN HAPPEN TO THEM OVERNIGHT!
YOU WON'T KETCH ME LEAVIN' THIS MORSE-ELECTROLIZED REAMER AROUND LOOSE!
I'D PUT THIS MORSE-ELECTROLIZED DRILL IN THE SAFE-DEPOSIT BOX, IF I HAD ONE! I'M GETTIN' 8 TIMES AS MANY HOLES!
THE ONLY BUILD-UP ON THESE MORSE-ELECTROLIZED CUTTERS IS MY PIECE-RATE!
WHO WOULDN'T TAKE IT HOME? THIS MORSE-ELECTROLIZED TAP IS GIVIN' ME LESS DOWN-TIME ... MORE PIECES ... MORE DOUGH!
MORSE
MORSE
MORSE

WE'VE GOT BAGFULS OF THESE
* A Certified Report from A User of MORSE Electrolized TOOLS:
TAPS
At (name of plant on request) the Superintendent confirms that piece-workers have made so much longer runs with Morse-Electrolized Taps that they're taking them home to avoid loss or breakage on successive shifts, so they'll be available for their own use the next day.

"Fantastic?" . . .

The Only Thing That's Fantastic is the Performance of the Tools!

Machinists have never seen such wear-life as they get from Morse-*Electrolized* Tools . . . up to 3, 4, and many times more than they ever got before. And certified reports are coming in daily from users* all over the country, piling up proof that *good tools* . . . Morse High Speed Tools, correctly specified for the job in hand . . . are the least expensive tools you can buy. In fact, in the light of production-gains and cost-reductions, *you can't afford to use any other tools BUT Morse-Electrolized.* See your Morse-Franchised Distributor, now.

(*Names of users, quoted on these pages, supplied on request.)

MORSE *Electrolized* REAMERS

"In Cast-Steel Valve Bodies, the Shell Reamer, 2⅝" in diameter, formerly used, gave 25-40 pieces per grind, with honing of the hole to size necessary afterward.

"Morse Electrolized Shell Reamers produced 250 pieces per grind . . . and *honing* was *eliminated.*

"We figure our saving at $50.00 per tool, for grinding *alone.*"

MORSE *Electrolized* DRILLS

"In Zinc Die-Cast, #41 Drills Electrolized, in a crosshole, at 10,000 r.p.m. and *no* coolant, run 8 hours — 7 hours more than formerly obtained with nitrided drills."

"In Brass and S.A.E. 1020 Steel Laminations, Electrolized Jobbers' Drills ran 2½ shifts before grinding. Best previous performance was only one shift."

MORSE *Electrolized* TAPS

"In Steel, cold-punched hex nuts, Morse Electrolized Tapper Taps, ½-13, produced 50,000 pieces before sharpening.

"Hitherto, 25,000 pieces was tops with re-sharpening impossible because of loss of size."

"On S. A. E. 1010 Bar Stock, on a special press, we had been getting 1200-1500 holes."

"With 4 Morse Electrolized Taps we averaged 11,334 holes, without sign of wear."

MORSE *Electrolized* CUTTERS

"In Hard Rubber, regular saws in a cut-off operation on tubing, 5/32"-5/16" O.D., would not cut without chipping the material.

"Morse-Electrolized Saws averaged 5000 cuts without a single work pieced chipped."

Sold only through MORSE-FRANCHISED DISTRIBUTORS

Accuracy, Quality, Uniformity: the MORSE Code of Cutting-Tool Manufacture

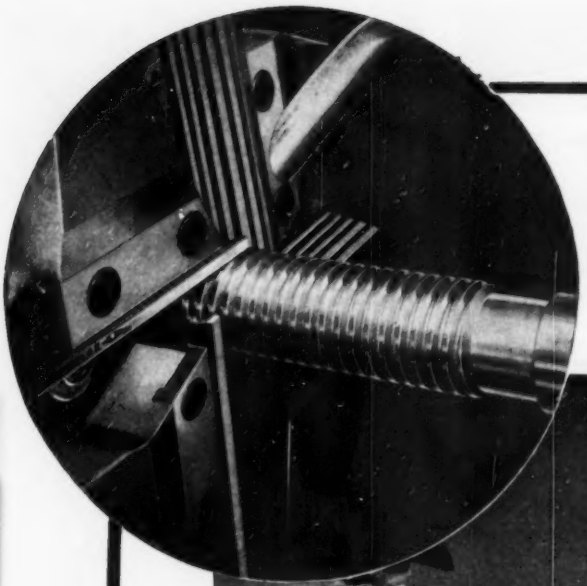
MORSE TWIST DRILL & MACHINE COMPANY

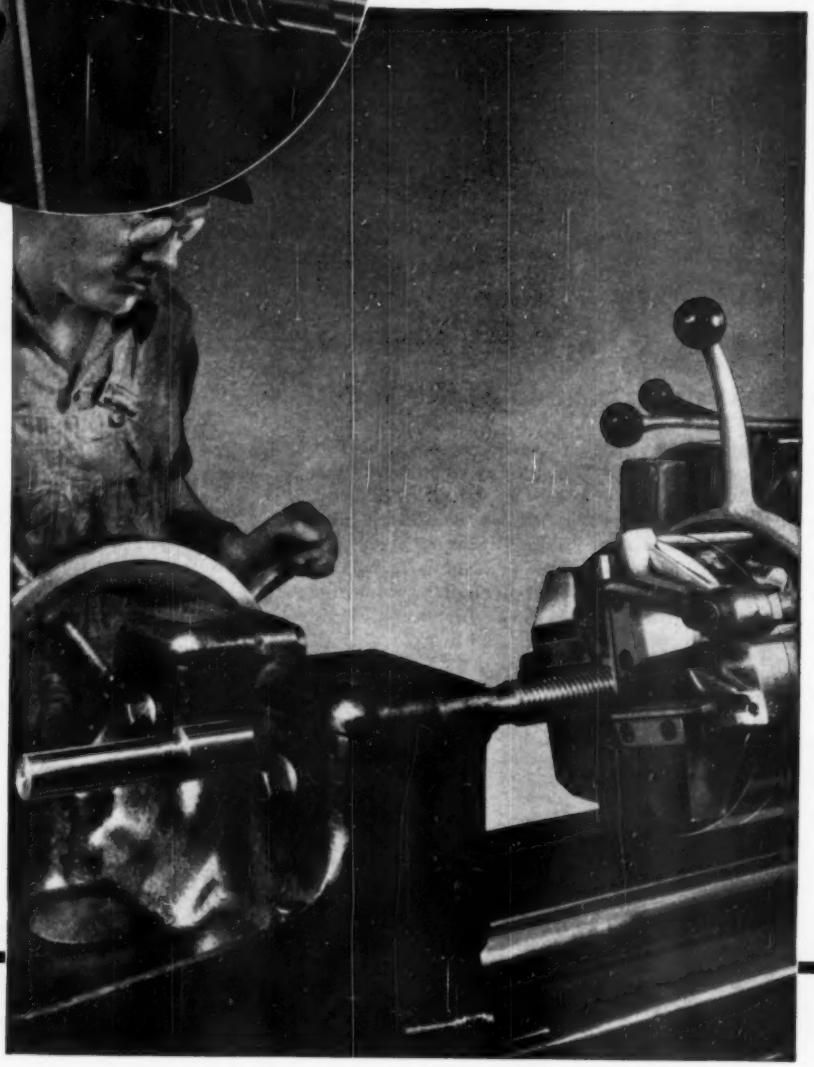
NEW BEDFORD, MASSACHUSETTS, U.S.A.

A DIVISION OF VAN NORMAN COMPANY

BRANCH WAREHOUSES: NEW YORK, DETROIT, CHICAGO, SAN FRANCISCO

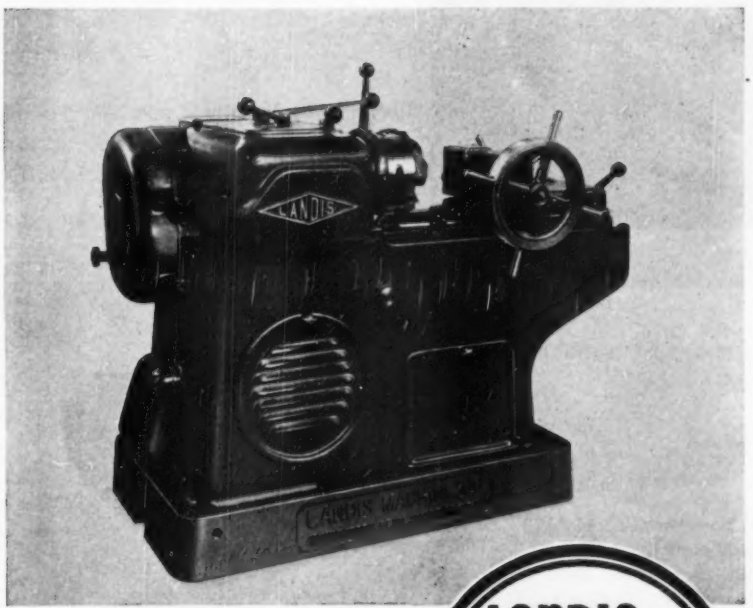
SAVING IN





THREADING TIME-94.2%

Landmaco Threading Machine Cuts Right- and Left-Hand Threads in 4.66 Minutes.



● 79.74 minutes formerly were required to cut threads on both ends of vise screws. The 1⅝" 4 pitch Acme threads 5¼" long on each end are now cut in one pass in 4.66 minutes, floor-to-floor time, using a Landmaco Threading Machine equipped with Leadscrew Attachment.

In finishing 12.9 pieces per hour, the machine is operated at a cutting speed of 24 surface feet per minute at 57 R.P.M. This large eastern manufacturer states that "production is increased 1710% over best methods previously used."

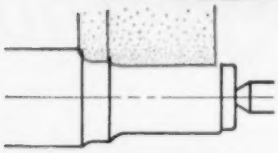
Write for Bulletin H-75

LANDIS Machine COMPANY
WAYNESBORO PA., U.S.A.

WORLD'S LARGEST MANUFACTURER OF ALL TYPES OF THREADING EQUIPMENT

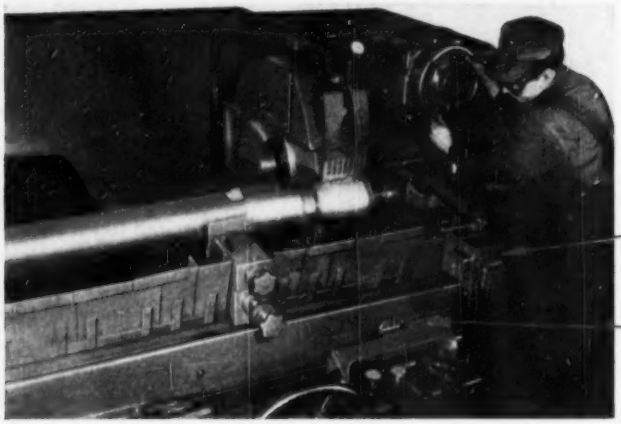
Special Tooling on Standard Type F Plain Grinder

LANDIS TOOL PUTS RAILROAD AXLE



High production

Plunge grind journal and seal diameter plus blended 1" and 1½" radii. Approximately .040" stock removed. Profile grinding wheel 12" wide for high production.



Profile wheel truing fixture control

Interchangeable profile bars

98

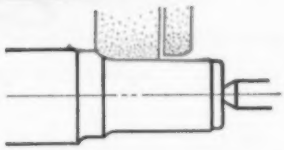
Electric rapid wheel head movement control and automatic grinding feed adjustment

All axle grinding operations shown were done on Landis Tool Type F Plain Hydraulic Grinders. For detailed specifications, request Catalog F48. Production estimates and tooling suggestions given without obligation.

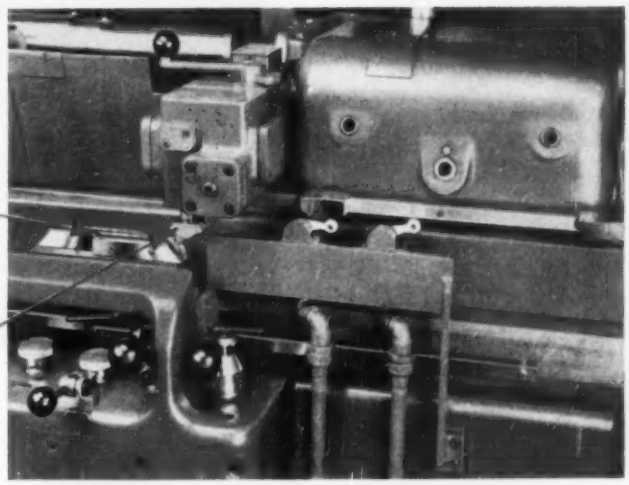
LANDIS TOOL
Precision Grinders

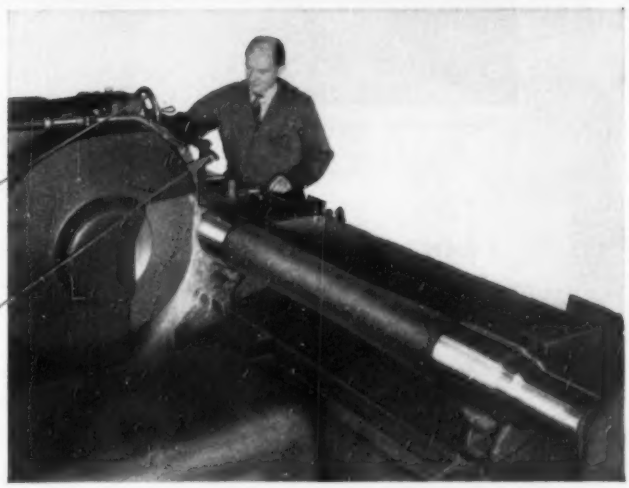
GRINDING on a COST REDUCTION BASIS

Flexible operation



Combination plunge and traverse grinding operation on journal and seal diameter plus blending radii. This permits variety of axles to be handled on one machine. Profiled grinding wheel.



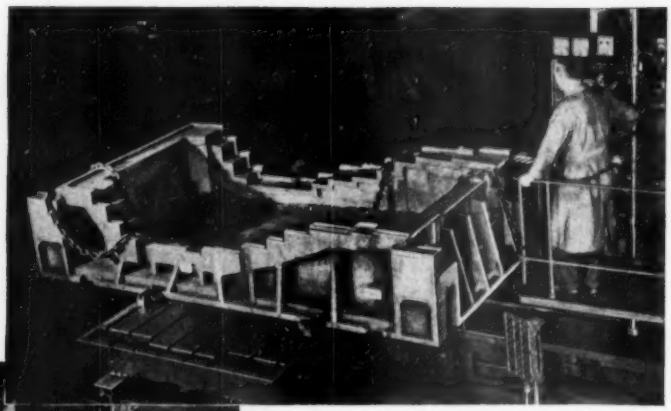


EQUIPPED WITH MICROSPHERE BEARINGS

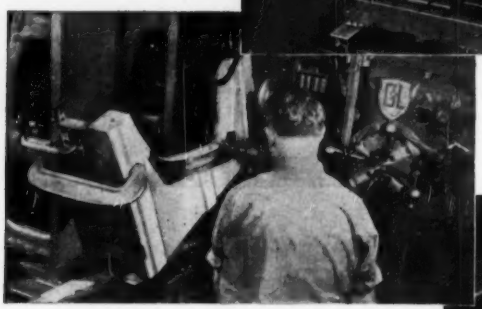
LANDIS TOOL COMPANY / WAYNESBORO, PENNA., U. S. A.

G. & L. MACHINE *Saves over 40 hours*

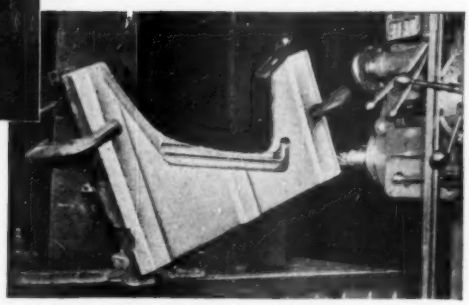
AUTOMOBILE ROOF TRIM DIE



This 9-ton roof top trim die is readily machined on a 570-T Table Type Giddings & Lewis Horizontal Boring Drilling and Milling Machine.



Contour milling of a segmental automotive window die



Simple angle plates hold this window die in position for machining. Set-ups like this mean worthwhile savings in over-all machining.

ENGINEERING HELP

Experienced Giddings & Lewis engineers will gladly discuss your die making problems and show you how to make exceptional savings by using G. & L. equipment. Do not hesitate to submit your machining problems for their consideration. There is no obligation for this help.

GIDDINGS & LEWIS
FOND DU LAC

IN MULTIPLE OPERATIONS ON HUGE

• • • Smaller G. & L. Profitably Mills Contours on Window Re-enforcement Forming Dies — And Machines Similar Other Die Segments Faster and Easier.

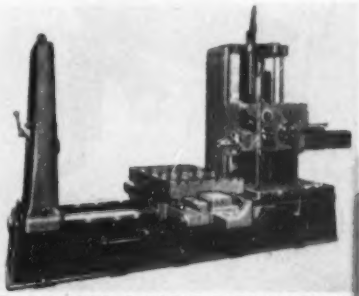
One of Detroit's largest producers of automotive body dies cuts machining time more than 40 hours on a *9 ton* roof top trim die by using a G. & L. horizontal boring machine. Performing the same operations on another machine required additional layout work, added set-ups and more actual machine time.

Now the steps on both sides of the die, the ends and side pads are milled in a floor-to-floor time of approximately 70 hours. The large table type Giddings & Lewis horizontal boring, drilling and milling machine has ample capacity to handle this huge casting. There are no interfering supports or columns to complicate the work set-up. An overhead crane readily positions the die on the machine table, where it is possible to perform machining operations easier, faster and more accurately.

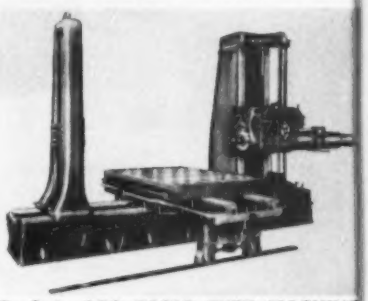
Increasing Production of Segmental Type Dies

Just as the large G. & L. machine, through its open construction, simplifies work set-up and speeds the machining of unusually big parts, the small versatile, highly flexible Giddings & Lewis horizontal boring machine quickens the output of segmental type dies.

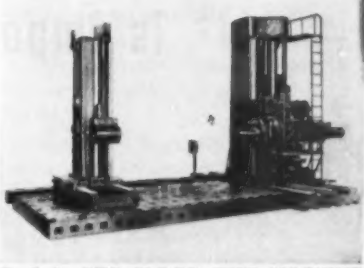
Two photographs show how a window re-enforcement forming die is mounted on angle plates and machined. Irregular shaped die components such as this part are contour milled, bored, drilled and faced without difficulty. On this window die only five simple set-ups were required to mill the insert recess, machine the ends and heel surfaces and bore a single one-inch hole. Versatility and flexibility of the G. & L. machine are obtained through longitudinal saddle movement, lateral table movement, vertical headstock movement and spindle traverse.



G. & L. 300-B TABLE TYPE MACHINE



G. & L. 350 TABLE TYPE MACHINE



G. & L. 570 FLOOR TYPE MACHINE

G. & L. Machine Accessories and Attachments profitably increase working range of standard machines. Write now for FREE 48-page book describing these worthwhile units.

MACHINE TOOL COMPANY

WISCONSIN U. S. A.

the right analysis is important

The right analysis is what counts in the selection of stainless steel for a particular job. Since stainless is a whole family of steels in a variety of grades and finishes, its use must be carefully planned. Crucible, pioneer in the development of these specialty steels, makes freely available to you the services of an alert metallurgical staff. These engineers and metallurgists are experienced in the application of stainless steels to countless requirements . . . and they can show you the stainless analysis best suited for your needs.

Crucible tackles every Industry-posed problem with the same careful attention to detail that is the measure of Crucible's half century of specialty steel leadership. Your application can benefit from this experience, and we are well prepared to help you. So, when you think of stainless . . . call Crucible. One word from you puts us to work for you. CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, N. Y.

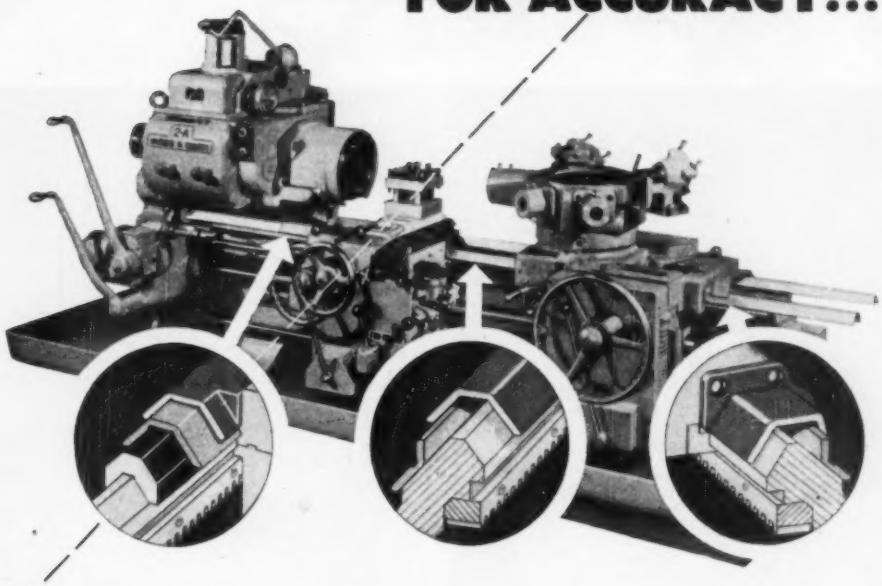
CRUCIBLE first name in special purpose steels

STAINLESS STEELS

fifty years of Fine steelmaking

STAINLESS • HIGH SPEED • TOOL • ALLOY • MACHINERY • SPECIAL PURPOSE STEELS

FOR ACCURACY...



•There is no substitute for VEE-WAYS

NEW MACHINE ACCURACY is maintained for many extra years of service because of a basic design which is a distinctive feature of all Warner & Swasey Saddle Type Turret Lathes. VEE-WAYS of high test nickel iron are cast integral with the DIAGONAL RIBBED, one piece bed. Induction hardened by an exclusive process for greatest wear resistance, the VEE-WAYS are then ground to smoothness and precision. The most heavily loaded saddle slides over the ways with an ease which makes hand wheel control almost effortless for the operator.

The VEE-shape distributes weight and pressure of saddle and loaded turret to make carriage self-aligning.

The heaviest roughing cuts and the finest finishing cuts are taken without necessity of adjustment . . . without possibility of weaving.

Patented Telescoping Way Covers (see illustration above) completely protect the VEE bed from scratches from chips or damage from dropped tools, etc.

Equally important, the Way Covers prevent the floods of coolant from washing away the film of lubricant carried to the Ways by automatic lubrication.

VEE-WAYS are only one of many valuable features of Warner & Swasey construction, but they are a fundamental principle which makes Warner & Swasey so easy to operate, and so outstandingly efficient in preserving extreme precision under long years of hardest service.

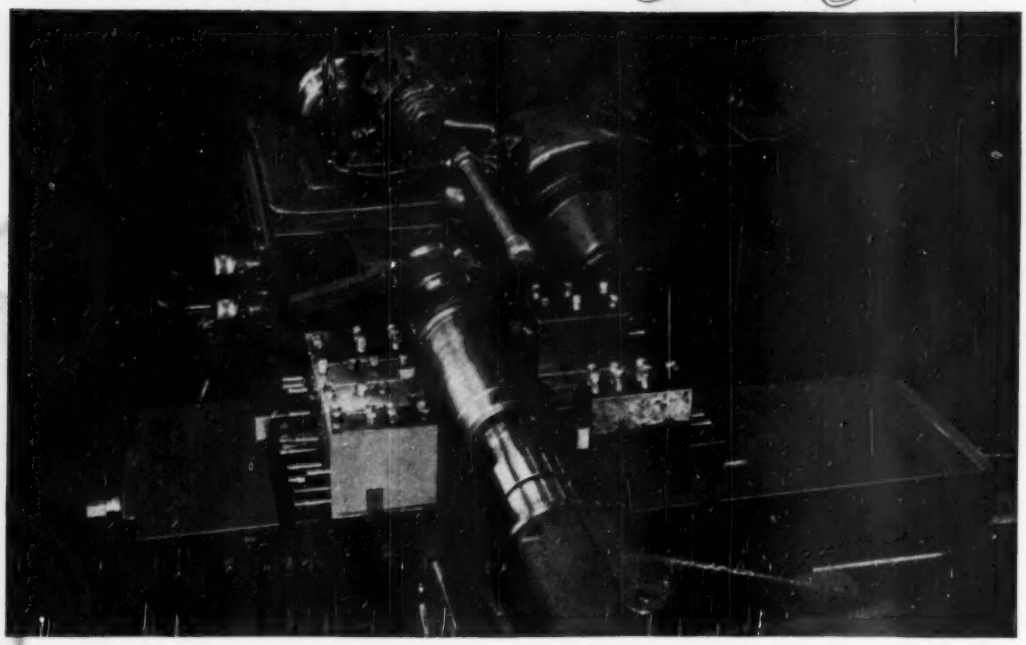
Your Warner & Swasey Field Representative can explain *all* the features of Warner & Swasey Machine Tools which make them so advantageous for low-cost production.

WARNER & SWASEY SELLS ONE THING . . . INCREASED PRODUCTION

WARNER & SWASEY Machine Tools *Cleveland*

TURRET LATHES, MULTIPLE & SINGLE SPINDLE AUTOMATICS, PRECISION TAPPING AND THREADING MACHINES

CYLINDER LINERS:



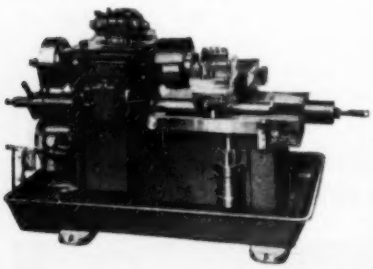
17 different sizes on One Automatic Lathe

THE GISHOLT No. 12 HYDRAULIC

You wouldn't expect an automatic lathe to handle such a wide variety of work as this—unless you know the Gisholt No. 12 Hydraulic.

This versatile automatic lathe handles 17 different sizes of cylinder liners ranging from 6½″ to 13″ in length and from 3″ to 5″ in diameter. The work is chucked on expanding arbors with interchangeable pads, while the front and rear tooling is mounted in standard, interchangeable tool blocks. This arrangement provides exceptional flexibility and a facility to quickly change over from one job to another.

When you can handle as many different sizes of parts on *one* automatic lathe—and cut both machining and set-up time—you're *bound* to cut your costs.



GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

Gisholt No. 12 Hydraulic Automatic Lathe—a rugged 12″ lathe that combines speed and accuracy with easy set-up—unique among automatics.

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

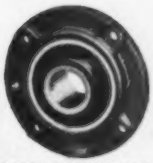
GISHOLT

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

There is a LINK-BELT Ball or Roller Bearing For Every Purpose

- **for light or heavy loads**
  in capacities to hundreds of thousands of pounds.
- **for low speeds or high speeds**
  to 5000 revolutions per minute, rated speeds. Higher speeds upon consultation.
- **for grease or oil lubrication**
  solid housing blocks for grease lubrication. Split housing blocks for either grease or oil.
- **for fixed or floating mounting**
  fixed housings for shaft location, floating bearings to provide for expansion and contraction.
- **for small or large shafts**
  in diameters from ⅝ to 7½ inches.
- **locked-on or pressed-fit**
  to suit commercial shafting or precision finished shafting.
- **with closed or open end**
  closed end for extra protection, open end for through shaft.
- **with solid or split housing**
  solid housing blocks for simplicity, split housing blocks for ease of installation.

FLANGED BLOCK


FLANGED CARTRIDGE BLOCK

HANGER BLOCK

CARTRIDGE BLOCK

TAKEUP BLOCK

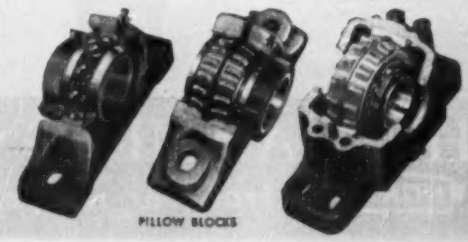
UNMOUNTED BEARING

May we send you the new Link-Belt Ball and Roller Bearing Catalog No. 2550, showing the complete line? A LINK-BELT engineer will make unbiased recommendations.

LINK-BELT COMPANY Indianapolis 6, Chicago 9, Philadelphia 40, Atlanta, Minneapolis 5, Houston 1, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Johannesburg. Offices, Factory Branch Stores and Distributors in Principal Cities.

11,000

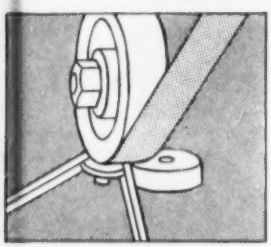
A complete line of bearings is available from stock, throughout the country, in pillow blocks, cartridge, flanged cartridge, flanged, hanger and takeup blocks —also unmounted bearings.


PILLOW BLOCKS

LINK-BELT
BALL & ROLLER
BEARINGS

Another *Endurance Record* with METALITE® Cloth Belts!

FINISHING AUTO WINDOW FRAMES
1400 per belt!



This Simple Arrangement
feeds the work under the belt for a fast volume job — typical of the many special methods which can be applied with backstand belt grinding. The Behr-Manning Engineer will help you develop the right set-up for your production.

■ The first operation is to rough grind out small pits, and even with this tough service a METALITE Belt lasts 900 pieces. Then the frames are oiled out for plating with LIGHTNING® METALITE Cloth Belts, 180 grit, to the extent of 1400 pieces per belt, with production speed in proportion.

LIGHTNING electo-coated, DURABONDED® METALITE Belts keep cutting uniformly, sharp, cool, with a minimum of loading. Pieces polish free of scratches, marks and holidays. And previous down time becomes profitable production time because LIGHTNING METALITE stays on the job.

Why not speed your output and grind down costs? Tell a Behr-Manning Abrasives Engineer to show you time and money savings in better finishing methods. Call the Behr-Manning office near you — or write us direct, Dept. AM-9.

BEHR-MANNING

BEHR-MANNING • TROY, N.Y.

Use NORTON® abrasives sharpening stones

Operators acclaim it as a money maker!

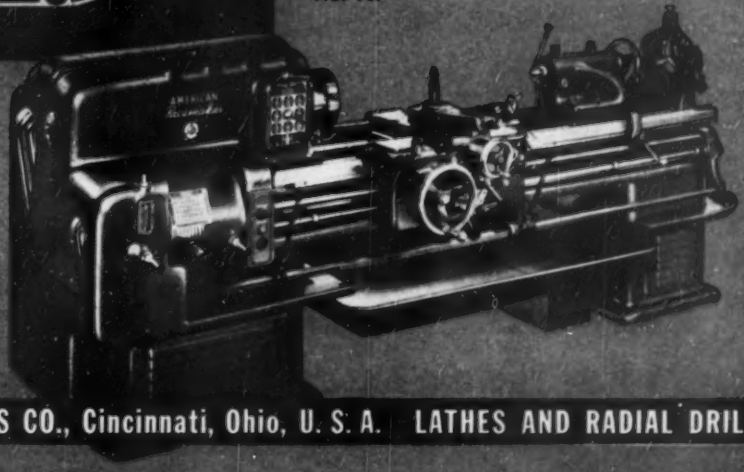
Whenever operators enthusiastically acclaim a feature as a money maker for them it automatically follows that it is likewise a money maker for the owners.

The direct reading speed control of "AMERICAN" Pacemaker Lathes is a real money maker and operators freely admit it. It makes their work easier; they can secure the right speed quicker; they produce more work because of it and, what is of paramount importance, the pay roll dollar buys more as a consequence.

The direct reading speed control unit shows at a glance the available speeds and the simple means of securing them. Imagine 27 spindle speeds being secured through only two conveniently placed direct reading levers without having to refer to index plates or having to retain lever positions in mind.

Furthermore, the simplicity of this mechanism and the infinitesimal time required to make speed changes inspire operator confidence and encourage him to make changes necessary to secure correct cutting speeds.

This and other fine features of the "AMERICAN" Pacemaker are thoroughly illustrated and described by Bulletin No. 16.



THE AMERICAN TOOL WORKS CO., Cincinnati, Ohio, U. S. A. LATHES AND RADIAL DRILLS

Introducing

H-P-M TWIN-POWER!

THE CHALLENGE TO INCREASING COSTS!

Here is a new and successful press to speed up production (up to 70% more strokes per minute) over conventional mechanical presses . . . enables you to use low cost non-premium metals for deep drawing . . . cuts scrap loss to the bone! Yes, H-P-M Twin-Power is a mechanical press . . . but a vastly different type of mechanical press. By employing hydraulics for: — rapid advance of slide to the work . . . for controlling pressures . . . for protection against overload . . . it wipes out the shortcomings of the conventional mechanical press. Think of the tremendous production possibilities opened to you with versatile, economical Twin-Power. Call in a nearby H-P-M Engineer to go over it with you in detail . . . to show you where it can serve you most effectively.

HERE'S WHAT H-P-M TWIN-POWER WILL DO . . .

Up to 70% more strokes per minute with no increase in draw speed.

Up to 45% reduction in draw speed with conventional number of mechanical press strokes per minute.

50% additional pressure at mid-point of slide stroke.

Full pressure for first 1/2 inch below mid-point of slide stroke.

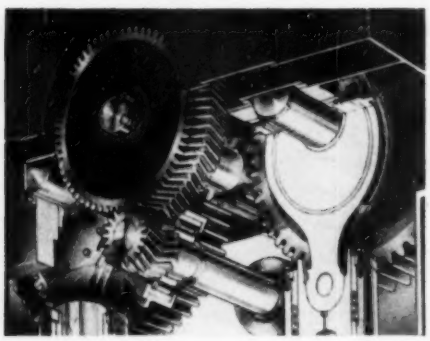
Faster, "foolproof" die setting—no screw adjustment—it's done hydraulically.

No die impact when maximum draw depth is used—hydraulics provide automatic slowdown to zero just before die contact.

Positive overload protection—through predetermined pressure adjustment.

Known adjustable pressures—through hydraulics.

Modern, all-welded, stress relieved, frame construction designed for maximum rigidity and a minimum of deflection.



HOW IT WORKS!

The H-P-M Twin-Power press differs from the conventional mechanical press in three important ways. One—the first half of the stroke is accomplished hydraulically, the second half with a conventional mechanical eccentric drive. Two—an eccentric of only one-half the size of a comparable conventional mechanical press is required by H-P-M Twin-Power. Three—50% additional pressure is available at mid-stroke making Twin-Power more applicable to a wider range of work. The H-P-M Twin-Power gear drive mechanism is simple . . . efficient . . . compact. It is fully enclosed and running in oil. It is built for maximum strength and a minimum of torsional deflection. The air operated clutch and brake is quick-acting . . . dependable . . . cool operating. All components are backed by 70 years of experience in serving the metal working industry.

THE HYDRAULIC PRESS MFG. COMPANY

1002 Marion Road • Mount Gilead, Ohio, U. S. A.

Irregular shaped parts like this 68½" long windshield header panel for trucks are formed and embossed at the rate of 400 per hour on H-P-M Twin-Power. This part is of 20 ga. steel, 11½" wide at center and 15¾" wide at each end where 4½" draws are made.

mail this coupon TODAY!

The Hydraulic Press Mfg. Company
1002 Marion Road
Mount Gilead, Ohio

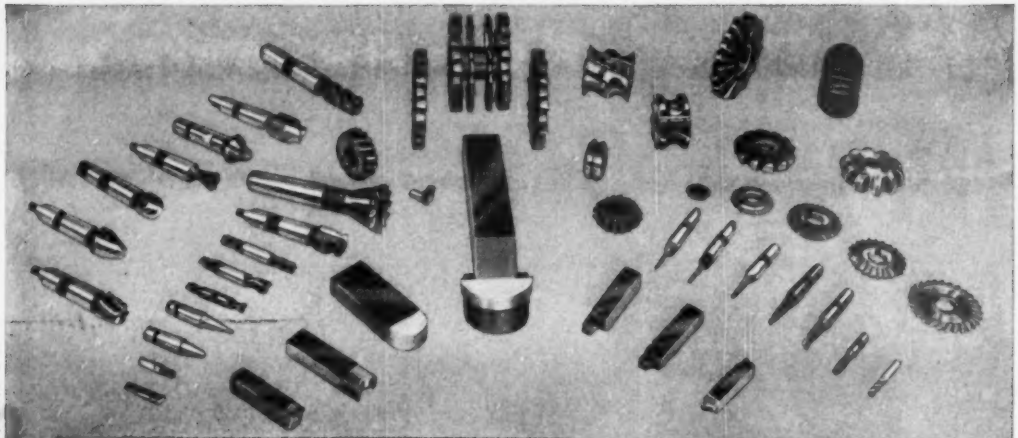
We are interested in knowing more about this revolutionary press. Send me a copy of H-P-M Twin-Power Bulletin 4903.

COMPANY NAME _____

INDIVIDUAL _____ POSITION _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____



All These Tools were sharpened with correct angles, radii and tangents on the...

PRATT & WHITNEY CUTTER AND RADIUS GRINDER

TYPE R-6 Maximum length of flute 4½"

TYPE R-8 Maximum length of flute 10"

SOLVE YOUR CUTTER SHARPENING PROBLEMS

The Pratt & Whitney Cutter and Radius Grinder is a sound tool investment that brings immediate returns through lowered sharpening costs, improved cutter life and better stock removal.

It sharpens milling cutters; end mills; thread milling cutters; lathe, shaper and planer tools; form cutters; die sinking and cherrying cutters; reamers; Keller cutters and tracers; and special tools. Whether standard or special — straight or spiral flutes — square, radius or ball ends — it grinds them uniformly, accurately and concentric with hole or shank, and with precision blending of angles and radii.

Write today for free bulletin describing this unusually versatile and economical machine.

PRATT & WHITNEY

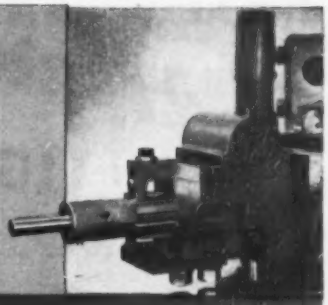
Division Niles-Bement-Pond Company
WEST HARTFORD 1, CONNECTICUT

MACHINE TOOLS • CUTTING TOOLS • GAGES

90th Year

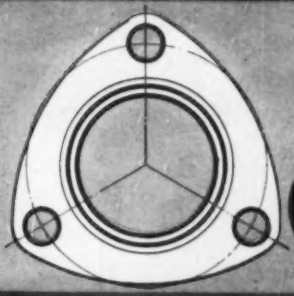
SYMBOL OF ACCURACY SINCE 1860

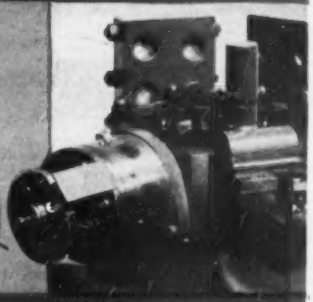
BIG SAVINGS



IN TIME • IN FLOOR SPACE • IN MACHINE INVESTMENT • IN LABOR COSTS

ON SMALL WORK





CASTINGS, FORGINGS AND CUT OFF BAR STOCK

WITH THE POTTER & JOHNSTON 3U AUTOMATIC

The combination of skillful P&J Tooling on the flexible P&J 3U Automatic makes this class of work most profitable. Note that the 1.8265 inch bore is larger than the diameter presented to the turret; the tool that takes the cut is the single point back boring slide illustrated in the upper photo. The lower photo shows the Multiple Spindle Drilling Attachment which indexes into exact alignment to engage with the chuck and drill the 3 flange holes simultaneously and without extra handling. Altogether, nine boring, turning, facing, beveling and drilling operations (as indicated by the heavy lines) are completed in a single chucking. Cutting cycles are fully automatic, as are all feed and speed changes; one operator easily handles a battery of 3U's, thereby spreading labor costs. Send parts or prints to P&J for tooling recommendations and detailed time estimates.

P&J 50 YEARS' EXPERIENCE IN TOOLING FOR *Precision + Productivity + Economy*

POTTER & JOHNSTON CO.

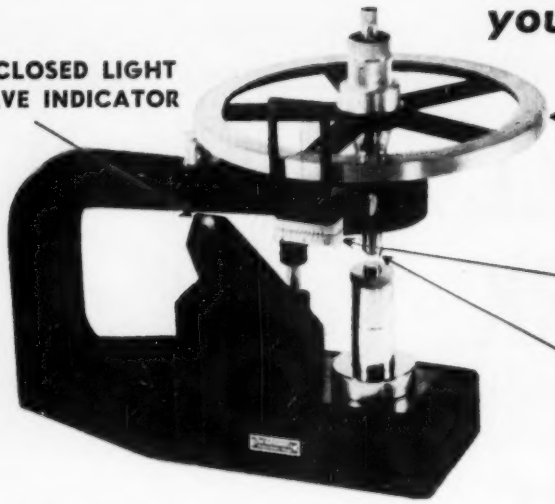
PAWTUCKET, R. I.

subsidiary of PRATT & WHITNEY

Division Niles-Bement-Pond Company

THE NEW Van Keuren 0 to 3" LIGHT WAVE MICROMETER

will improve your product . . .



CATALOG AND HANDBOOK No. 34

This 208-page volume represents 2 years research sponsored by the Van Keuren Co.

It presents for the first time in history a simple and exact method of measuring screws and worms with wires.

It tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods.

Copies free upon request. ●

THE Van Keuren Light Wave Micrometer is an instrument of exceptional merit, proven over a period of 15 years. It has enabled hundreds of High School boys and girls to produce and inspect parts to "Hundred Thousandths" of an inch.

The New 0 to 3" Light Wave Micrometer has a ½" diameter, 40 threads per inch micrometer screw, which can be made with greater accuracy and which has 3 times the wearing surface of an ordinary micrometer screw. It has an 8" diameter micrometer wheel, with .0001" graduations 1/10" apart. It has a non parallax, vernier index which enables readings to be made to .00001". It has an index lock. It has carboloy tipped anvil and spindle. It is a sturdy, yet sensitive instrument which weighs 17 pounds. It is a portable measuring machine, built for "Sustained Accuracy."

The Light Wave Micrometer is not a comparator. No gage blocks are needed and no errors creep in from worn blocks. It is a direct source of dependable precision—fast, accurate and profitable.

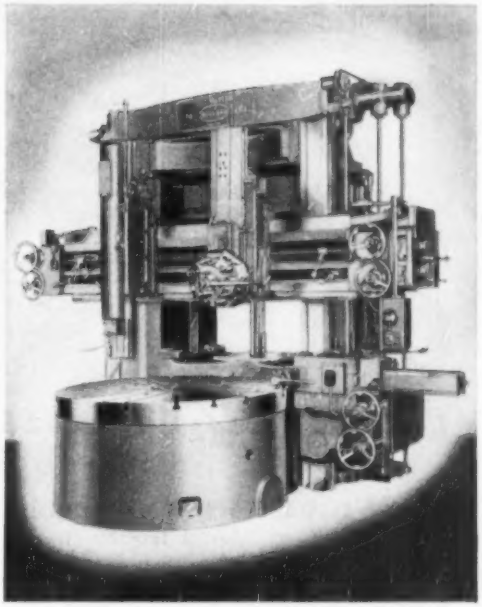
THE Van Keuren CO., 173 WALTHAM STREET, WATERTOWN, MASS.

31st YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires

What Cut Master does for us

C. L. Gougler Machine Company of Kent, Ohio, need machine Flexibility.



BULLARD 74-inch CUT MASTER VERTICAL TURRET LATHE

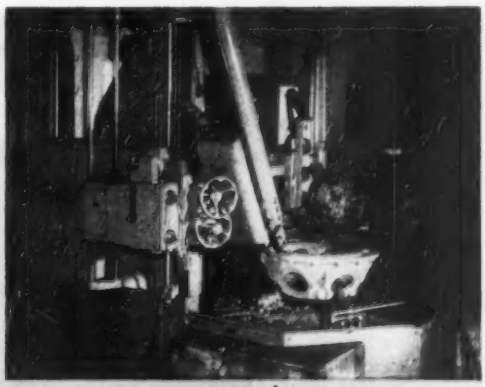
"We really don't have enough of the size of work for which it is absolutely necessary to have a machine as large as this Bullard Cut Master to justify purchasing one. BUT, because we use the Bullard for other — smaller — work, as well, **we get a good return from our investment in this machine.**"

"We like Bullard mills, have quite a number of them around the shop — and we are particularly satisfied with the per formance of the 74" Cut Master we have bought more recently. This machine is used for turning and boring parts for large hydraulic presses, Diesels and castings for autoclaves. It was originally purchased only for the very large pieces which we could not handle on other machines but now we use it for a great variety of operations. There is not enough work of one kind in a shop of our type to keep a machine going on just one kind of work and **the more flexible a machine is the better it meets our requirements.**"

OPERATIONS

Facing large end of head 3' 6½" diameter
Bore angle clearance for piston
Small bore for unloader pocket

After these operations are completed, the head is inverted and centered on a ring. In this position, the opposite end is faced and the bore for the unloader pocket machined.



74" Bullard Cut Master Machining Cylinder Head

THE BULLARD COMPANY

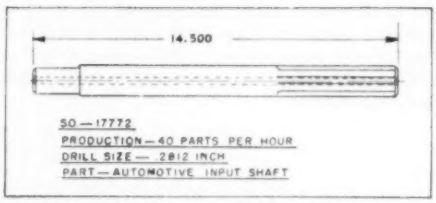
BRIDGEPORT 2, CONNECTICUT

ARE YOU HAVING HOLE TROUBLE TOO?

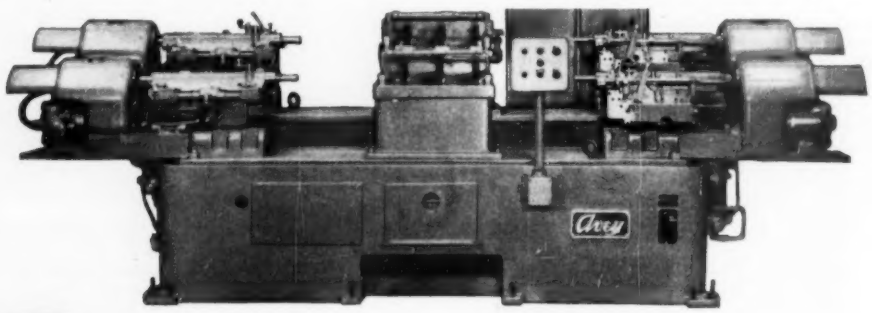
LET Avey ENGINEERS SOLVE YOUR PROBLEM!

HORIZONTAL DEEP HOLE DRILLING MACHINE

S. O. No. 17772 — Consists of four No. 1 *Avey-draulic* (hydraulic) Deep Hole Drilling Units mounted horizontally on a well-ribbed fabricated steel base. The Units having 12" ram travel were arranged in pairs to drill a $\frac{7}{32}$" diameter hole 14½" deep from both ends. An electrical interlock was provided to prevent drill interference. The coolant system and hydraulic power source were incorporated in the base. Machine as illustrated conformed to Automotive Standards. Write for literature.

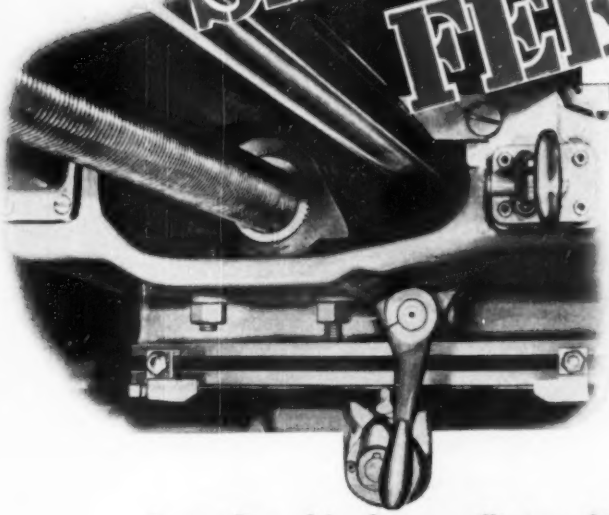


Fixtures—The fixtures were Vee Block type hand clamping to accommodate one part each.
Material—8641 Steel.



Avey DRILLING MACHINE CO.
CINCINNATI 1, OHIO

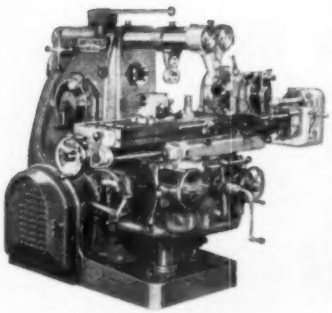
SMOOTHER FEED



You'll get the smoothest feed performance ever on Kearney & Trecker's new CK milling machines. Why? Because these CK's have a new design, heavy duty, 2" diam. table feed screw rotating through an extra-long table feed nut — giving you more bearing contact. That means Smoother Power Feed and longer screw life. Add the positive-acting backlash eliminator and you get CK's smoother, more effective climb milling. What's more, the separate motor drive for table feed is interlocked with the spindle drive motor for overload protection. No danger of stalling cutters in cut.

A new line of knee-type milling machines

KEARNEY & TRECKER MILWAUKEE **CK's**



15 hp No. 3
Model CK
Universal Style
with 5 to 1 ratio dividing head and low head attachment

YES, Kearney & Trecker's new CK milling machines are packed with design and operating features that make them *more productive, more profitable for you.*

Spindle-mounted flywheel, broad feed and speed ranges and greater horsepower with separate motor drives for spindle, and feed and rapid traverse, mean you get fullest possible benefit from modern cutting tools.

New CK columns give you greater rigidity. Compared to former columns, they give you 1000 pounds more metal in heavier ribbing, in box-type, sponson construction to absorb the heaviest cutting loads.

For greater production, these machines are equipped with Kearney & Trecker's famous Mono-Level Control that shortens floor-to-floor time, and materially reduces operator fatigue. New, non-glare micrometer dials help avoid costly errors in reading . . . give you a positive lock at every setting.

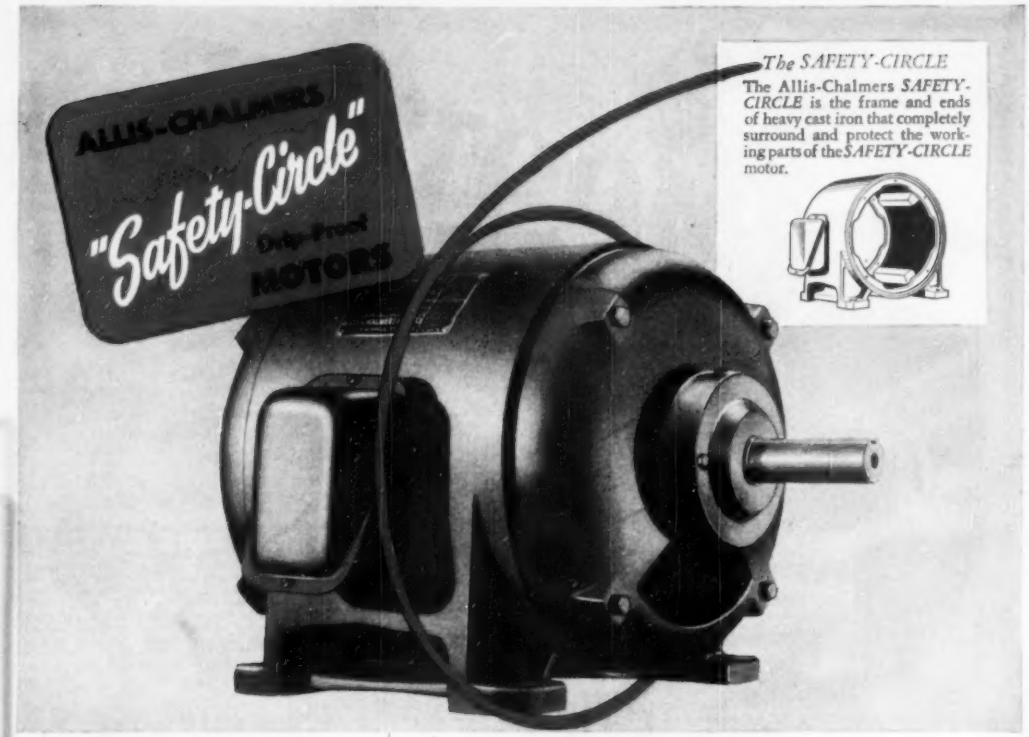
Automatic flood lubrication in column and knee and positive metered lubrication to table and saddle, plus generously proportioned gears and shafts assure you greater machine life.

Find out for yourself about Kearney & Trecker's new CK line of knee type milling machines . . . how they meet every demand of modern milling practice . . . how they can give you greater production at greater profit.

Sizes are No. 2, 3, 4, 5, and 6 . . . Plain and Universal styles. For complete details, contact your nearest representative or write direct. Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.

REPLACEMENT OF OBSOLETE MACHINE TOOLS IS AN INVESTMENT THAT MAKES BOTH DOLLARS AND SENSE

KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS



The SAFETY-CIRCLE

The Allis-Chalmers *SAFETY-CIRCLE* is the frame and ends of heavy cast iron that completely surround and protect the working parts of the *SAFETY-CIRCLE* motor.

SAFETY-CIRCLE means

★ All-Around Protection ★ Low Maintenance ★ Dependable Performance

THE *SAFETY-CIRCLE* MOTOR is protected all around against those four great motor killers — corrosion . . . distortion . . . friction . . . foreign matter. The frame is of cast iron, the most corrosion-resistant material for this purpose.

The strength and stiffness of the cast iron is supplemented by ribbing and bracing to maintain alignment and prevent distortion. Ball bearings are lubricated and sealed at the factory. They require no attention for years. End brackets are drip-proof at no premium.

SAFETY-CIRCLE motors are fully protected inside, too. Multiple-dipped and multiple-baked stator plus extra inter-phase insulation provide extra protection against electrical breakdown.

With *SAFETY-CIRCLE* protection outside and protected working parts inside, you can count on years of trouble-free, low cost power.

For complete details on *SAFETY-CIRCLE* advantages, see your A-C Authorized Dealer or Sales Office or write for Bulletin 51B6210B. Stocked in sizes 1 to 20 hp. *SAFETY-CIRCLE*, *Texrope* and *Vari-Pitch* are Allis-Chalmers trademarks.

ALLIS-CHALMERS, 999A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS

A-3144

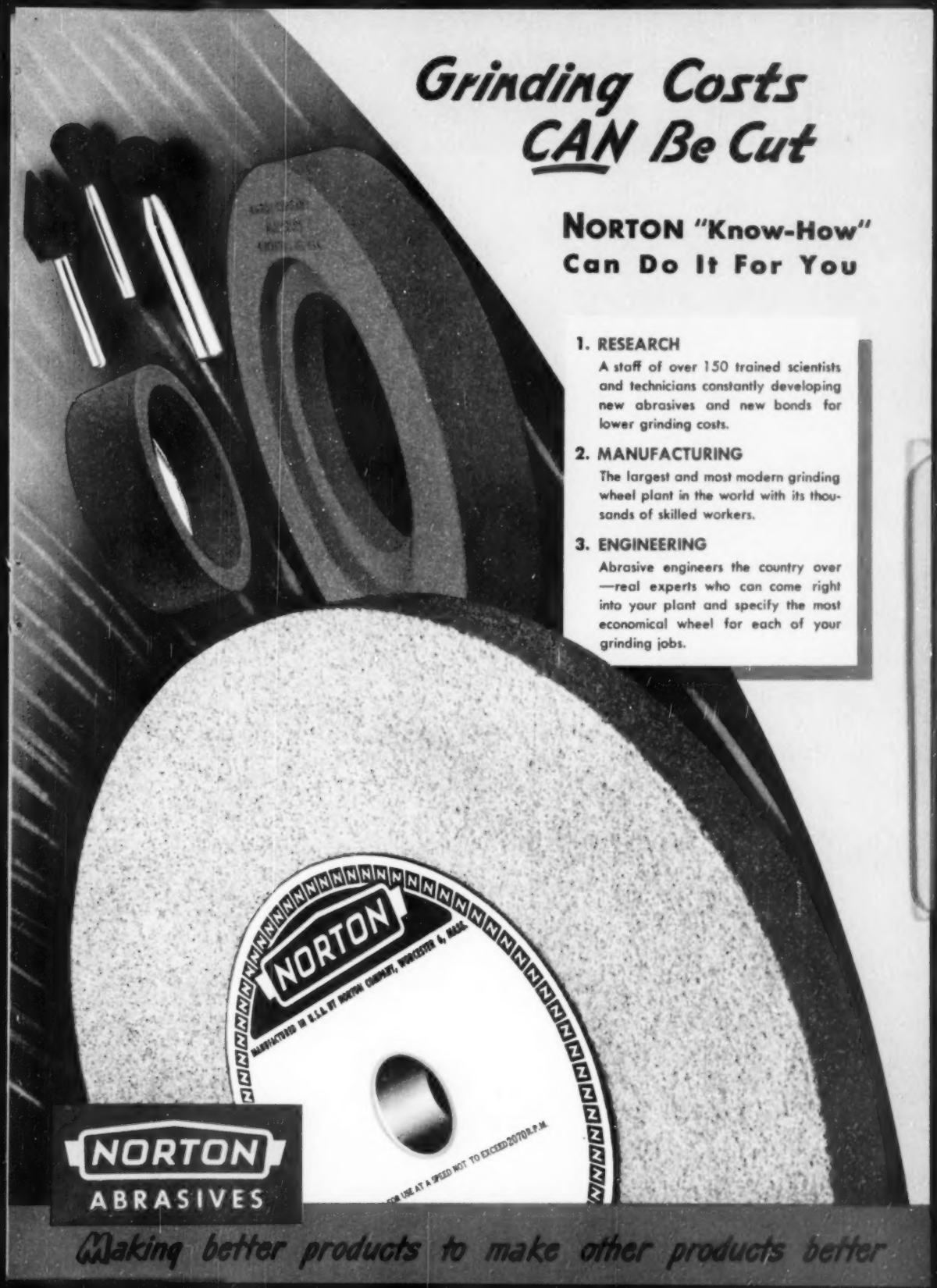
Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.



Grinding Costs CAN Be Cut

NORTON "Know-How" Can Do It For You

1. **RESEARCH**
   A staff of over 150 trained scientists and technicians constantly developing new abrasives and new bonds for lower grinding costs.
2. **MANUFACTURING**
   The largest and most modern grinding wheel plant in the world with its thousands of skilled workers.
3. **ENGINEERING**
   Abrasive engineers the country over —real experts who can come right into your plant and specify the most economical wheel for each of your grinding jobs.

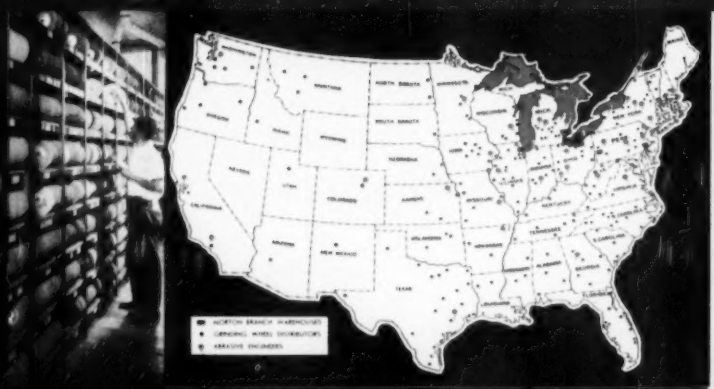
NORTON
ABRASIVES

Making better products to make other products better

Skillful Grinding Wheel Engineering...backed by PROGRESSIVE RESEARCH

ONLY the *correct* grinding wheel on each job can give you minimum grinding costs. And right near you there's a Norton abrasive engineer who can see that you get that correct wheel. He's an expert in wheel selection and he has the most complete variety of wheels in the industry to select from—including the exclusive 32 ALUNDUM abrasive. Back of him, continually developing still better abrasives and bonds to do your grinding jobs even more economically, are the largest and best-equipped research laboratories in the industry.

Adequate Grinding Wheel Stocks.....STRATEGICALLY LOCATED



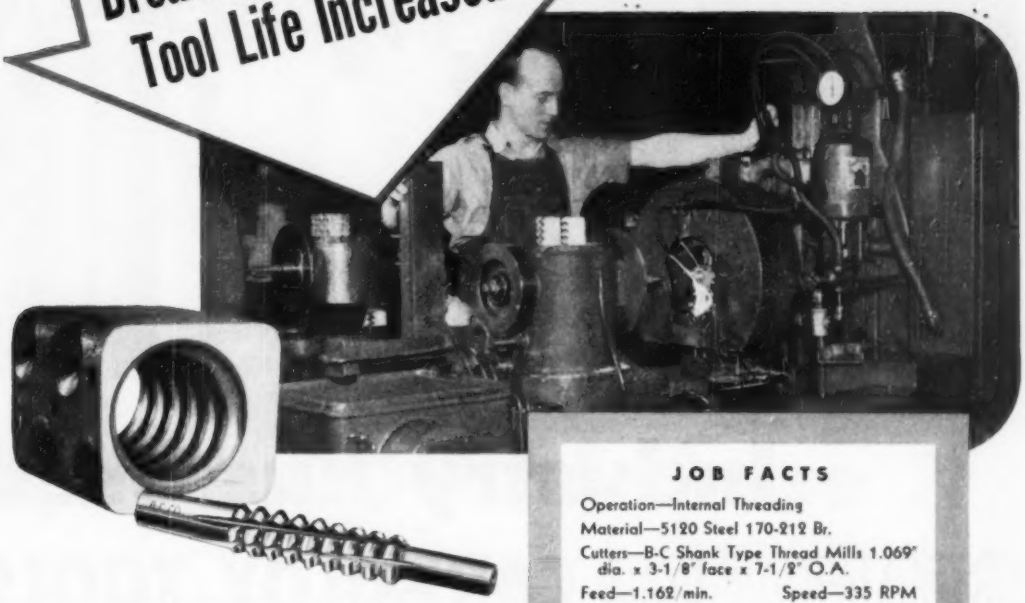
WHEN the correct wheels for your jobs have been determined, they are handy to you—on the shelves of Norton distributors in over 225 cities of the United States. And these local stocks are carefully selected to meet the particular needs of each individual area. Back of these distributor stocks are the Norton branch warehouses in five important industrial centers and the gigantic stock rooms at the mile-long Worcester plant. Serving foreign countries are six Norton branch grinding wheel plants and scores of distributors in all principal cities.

NORTON
ABRASIVES

Main Office and Plant of
NORTON COMPANY
Worcester 6, Massachusetts

Abrasives · Grinding Wheels · Grinding and Lapping Machines · Refractories · Pulpstones · Non-slip Floors · Coated Abrasive Products · Laboratory Machines

Breakage Eliminated! Tool Life Increased!



With BARBER-COLMAN
JOB-ENGINEERED FORM CUTTERS

JOB FACTS

Operation—Internal Threading
Material—5120 Steel 170-212 Br.
Cutters—B-C Shank Type Thread Mills 1.069" dia. x 3-1/8" face x 7-1/2" O.A.
Feed—1.162/min. Speed—335 RPM
Cutting Time—.56 min.
Tool Life—350 pces./sharp.
10,500 pces./cutter

More production with less tool cost is the record on this job. Small diameter internal threads with special form require a tool with a long cutting face, capable of removing a large amount of metal at high speed. The heavy chip load causes vibration which, on conventional type unsupported thread cutters, results in frequent breakage and poor tool life.

Barber-Colman cutter engineers designed a special tool with extra clearances and an outboard pilot support to steady the cutting action. Now cutting time has been reduced to .56 minutes per piece and tool life has reached the remarkable level of 10,500 pieces per cutter.

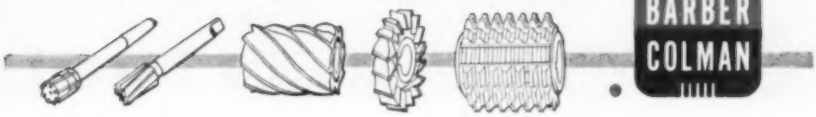
Cutting tools built to fit the specifications of the job always pay off in lower tool costs and lower production costs. That's why we'd like to show you what Barber-Colman Job-Engineered Cutters will do on your next job.

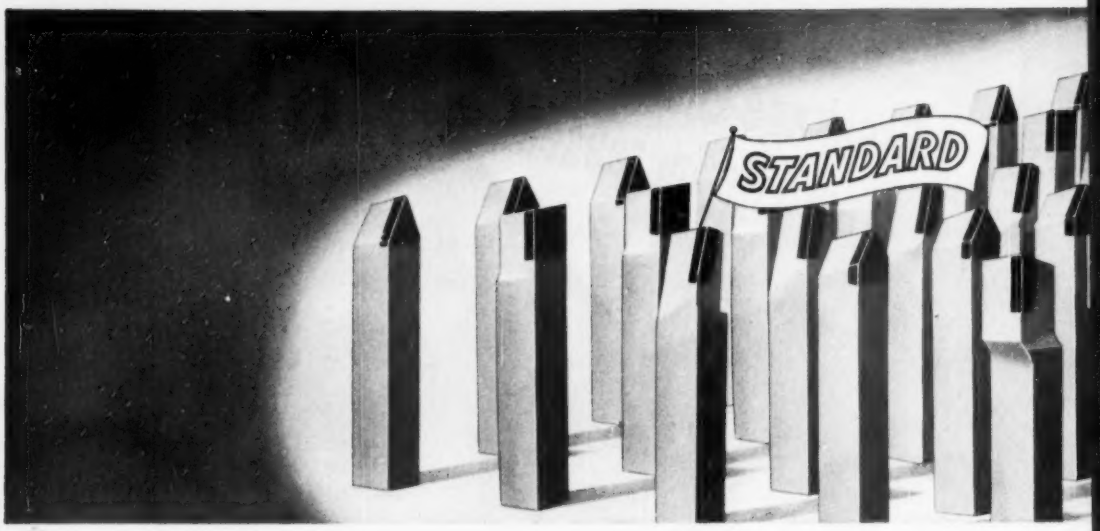
FREE

Get this complete catalog of Standard and Special Milling Cutters and Reamers. Write for File No. 8138.

Barber-Colman Company

GENERAL OFFICES AND PLANT, 8138 LOOMIS ST., ROCKFORD, ILLINOIS, U. S. A.





Industry has used STANDARD CARBOLOY TOOLS

COUNTLESS manufacturers in every field — a list reading like a "Who's Who" of industry — use these 11 styles of general-purpose Standard Carboloy Tools for up to 80% of all their single-point tool machining operations.

Why Standard Carboloy Tools? Here are some big reasons:

Adaptability—they can be quickly and economically ground in your own tool room for a variety of jobs; eliminate the need for a large, costly inventory of special tools.

Universal Use—can be used in lathes, boring mills, etc., to machine any metal or nonmetal; for hundreds of single-point tool machining operations. Suitable for job lots or quantity production.

Low Cost—versatile Standard Carboloy Tools are comparable in price to many high-speed steel tools, and in many sizes actually cheaper. Mass-produced under rigid quality controls to give you the highest quality at low investment costs.

Availability—you can get fast local delivery. Over 200,000 Carboloy Standards are available at all times in 93 cities, coast to coast.

And you can add the advantages of simplified ordering, easy selection and versatile grades, plus the extra assurance that in the Carboloy brand of tools you get uniform quality in *every* tool . . . in *every* order . . . in *every* regrind.

Write today for information on how you can standardize with Standard Carboloy Tools and save.

CARBOLOY COMPANY, INC.
11149 E. 8 MILE BLVD., DETROIT 32, MICHIGAN

CARBOLOY®
CEMENTED CARBIDE
STANDARD TOOLS

13,000,000 of these 11

When you specify STANDARD Carboloy Tools you get these 7 quality features

1. **Uniform Carbide Tip**—Consistent performance, regrind after regrind, in every tool
2. **Full-size Tips**—Long tool life and maximum regrinds
3. **Uniform Strong Braze**
4. **Cold-drawn Steel Shank**—Maximum support of cutting edges
5. **Diamond-ground Cutting Edges**—On automatically controlled machines
6. **Plastic-dipped** — Protects sharpened cutting edges in transit and in tool crib
7. **Colored Shank for easy identification**—Orange for steel cutting; aluminum for non-ferrous.

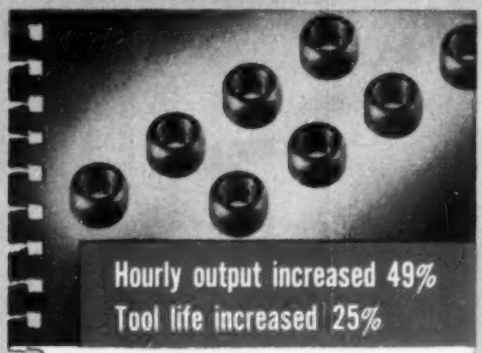
11 low-cost styles of STANDARD Carboloy Tools will do up to 80% of your general machining

(Left-hand Styles. Right-hand not shown)

"The least number of tools for the greatest number of jobs"

It Pays to Standardize with
STANDARD CARBOLOY TOOLS

NOW...a simple rule for making



Hourly output increased 49%
Tool life increased 25%

Grade: MX
Cold drawn size: 5/16" Rd.
Part name: Sleeve
Machine: Brown & Sharpe No. 0
Operations: Stop, drill, ream, finish form, cut-off
Cutting media: Cutting oil 9CA

Comparative production:

Grade	SFM	Seconds Per Part	Tool life Hours	Hourly Output rate *	Parts per Tool Grind
B-1113	147	11.0	8	250	2000
MX	147	7.5	10	373	3730

*Based on 70% efficiency

MX permitted 86% more parts per tool grind.
(Material cold drawn by Bliss & Laughlin, Inc.)

Daily output increased 19%
Tool life increased 39%

Grade: MX
Cold drawn size: .738"/.742" hexagon
Part name: Oilpan drain screw plug
Machine: Brown & Sharpe
Operations: Rough form, thread shave, cut-off
Cutting media: Paraffin Oil

Comparative production:

Grade	Seconds per part	Daily Output rate	Tool life hours
B-1113	10	2100	2.3
MX	10	2500	3.2

Better finish and closer tolerances are reported on this job with MX. Longer tool life—less down-time—accounts for the increased output.
(Material cold drawn by Pilgrim Drawn Steel Company)

Production increased 42.5%
Tool life increased 100%

Grade: MX
Cold drawn size: 3/4" Rd.
Part name: Washer
Machine: Brown & Sharpe
Operations: Drill, ream and cut-off
Cutting media: Sulphurized Oil

Comparative production:

Grade	SFM	Seconds Per Part	Hourly Output rate *	Tool life hours	Parts per Tool Grind*
B-1113	172	14.2	177	2 or less	334
MX	250	10.0	252	4	1008

*Based on 70% efficiency

Customer reported good chip formation.
(Material cold drawn by Bliss & Laughlin, Inc.
Machined by Reliable Screw Machine Products Co.)

Production increased 26%
Tool life increased almost 100%

Grade: MX
Cold drawn size: 5/8" Rd.
Part name: Wheel bearing
Machine: Acme Gridley
Coolant: Combination lubricating and cooling oil, sulphur free

Comparative production:

Grade	SFM	Seconds per part	Parts per hour	Production increase	Tool life increase
B-1113	185	7.2	500		
MX	235	5.7	635	26½%	almost 100%

Finish good; part tolerance OK.

better parts at lower cost

"DO THE JOB WITH MX"

the new free-machining Bessemer screw stock!

THEY'VE been getting some remarkable results with U·S·S Free-Machining MX Bar Stock. From shops all over the country we're receiving reports like this: *Output increased 17% . . . 29% . . . 66%. Time between tool grinds increased 20% . . . 87% . . . 200%. Cost of parts reduced 6% . . . 16% . . . 22%.* These are actual figures on jobs being done right now as MX goes on proving its ability to out-perform standard B-1113 stock.

And there's more to the MX success story than "more parts per hour" and "lower cost per part." Where finish is important, or where sizes must be held to close tolerances, fewer rejections are the rule when MX Bar Stock is used in place of B-1113. That's just another plus you can give MX.

Are you wondering where you can put MX to work? The answer is—*wherever you are now using standard B-1113.*

MX will prove its wortn on a cost basis wherever you use it. Even on short runs and without any change in your present machine set-up, MX will more than offset its slight additional cost by lessening down-time and providing extra parts. On long production runs you really hit the jackpot, for you can modify your set-up to take full advantage of the faster speeds and heavier cuts possible with MX. (These adjustments can usually be made without expensive camming arrangements and without changing your present tools or cutting oils.)

Give MX a thorough trial on your equipment. Let MX prove right in your own shop that it is the freest-cutting Bessemer stock that has been offered to the automatic screw machine field . . . the most economical and the most efficient Bessemer screw stock developed.

MX is produced in the popular bar sections and sizes. You can obtain it in cold-finished form from your regular supplier. In hot-rolled bars MX is available through our nearest district sales office.

CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH
COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

Carnegie-Illinois Steel Corporation
Room 2162, Carnegie Bldg., Pittsburgh 30, Pa.

☐ Please send me a copy of MX Bulletin.

Name.....

Company.....

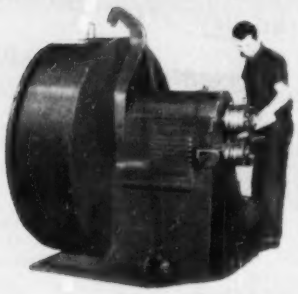
Address.....

City.....Zone....State.....

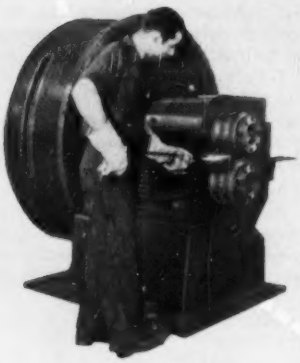
9-1661

UNITED STATES STEEL

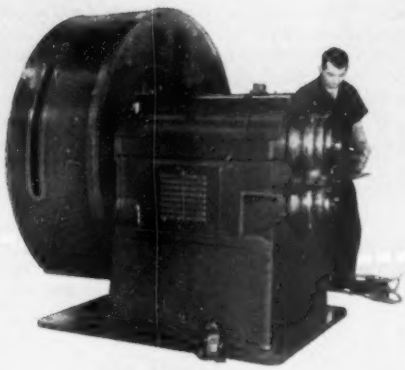
NO. 1 REDUCEROLL



NO. 2 REDUCEROLL



NO. 4 REDUCEROLL



NO. 6 REDUCEROLL

QUESTION:
"HOW CAN I CUT MY FORGING COSTS?"

ANSWER:
"REDUCEROLL YOUR FORGING BLANKS!"

REDUCEROLL FIELD REPORTS

How successfully National's new REDUCEROLL substitutes simplicity and economy for costly forging practices in the preparation of forging blanks, is indicated in the following testimonials. Statements refer to routine, in-production operations.

CASE 1

"Application of REDUCEROLLS to our connecting rod line makes possible an 81% increase in production rate . . . already getting 60%."

CASE 2

"Saving 1.5 pounds of stock per double steering arm forging."

CASE 3

"Aircraft connecting rod production increased 125% . . . grain flow better . . . saving two pounds of steel per forging."

CASE 4

"Will save more than four pounds per piece . . . producing 150 per hour."

CASE 5

"Automotive spindle support . . . saving 1.5 pounds per double forging."

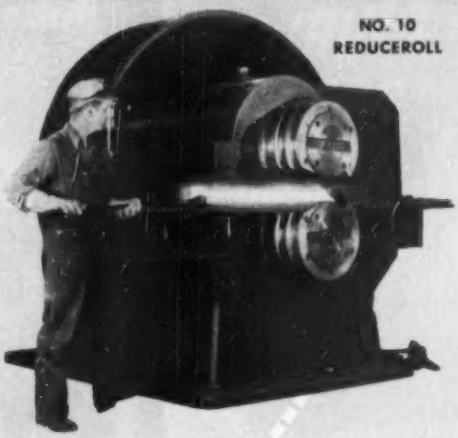
CASE 6

"Saving 1.21 pounds of stock per rod forging."

CASE 7

"Nearing 200,000 axle shafts preformed . . . still using original non-heat-treated rolls."

NO. 7½ REDUCEROLL



NO. 10 REDUCEROLL

In the field less than two years, the rugged REDUCEROLL has already distinguished itself for versatility and dependability in leading forge plants. Typical REDUCEROLL advantages include:

1 Higher production.
2 Savings of material.
3 Increased forging die life.
4 More uniform forgings.
5 Less wear and tear on heavier forging equipment.
6 Portability—"roving tool."
7 Ease of operation.
8 Low-cost rolls quickly interchangeable.

Our entire organization is available to help you investigate the application of new forging techniques to your jobs. Send us a print or sample of the part you wish to forge. Better yet, pay us a visit. No obligation, of course.

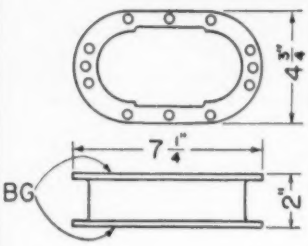
NATIONAL
MACHINERY COMPANY
TIFFIN, OHIO.

DESIGNERS AND BUILDERS OF MODERN FORGING MACHINES—MAXIPRESSES—COLD HEADERS—AND BOLT, NUT, RIVET, AND WIRE NAIL MACHINERY

New York Detroit Chicago

BLANCHARD *is BEST...*

for roughing and finishing parts such as these



Pump bodies are typical of a wide variety of jobs requiring one operation to remove stock from the rough casting, then a finishing operation for extreme flatness and close size tolerances.

For heavy roughing, use the Blanchard No. 18. On this job, 22 pump bodies are rough ground in one chuck load. .100" is removed per side.

For accurate finishing, use the Blanchard No. 18. 16 pump bodies are finished in one chuck load to a tolerance of ±.0003" and flat to .0003" to assure a tight joint.

For fast heavy roughing or accurate finishing, use the Blanchard No. 18. These parts are produced at the rate of 38 pieces (76 surfaces) per hour.

Send for your free copies of "Work Done on the Blanchard," third edition, and "Art of Blanchard Surface Grinding."

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY **64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.**

Laboratory Products for MEASURING THICKNESS

G-E X-Ray and Beta-Ray Thickness Gages
—*for measuring moving strips*

These gages enable you to save in two ways in the high-speed production of sheet or strip materials:

1. You can cut scrap losses

Because these equipments indicate thickness as soon as the strip starts through the mill, you can reach gage in a hurry.

Operators at Weirton Steel Co., West Virginia, for example, report that their G-E X-Ray Gage enables them to reach gage on the first strip.

2. You can make savings in raw materials

Because the gages enable you to hold close tolerances, you can produce the maximum amount of strip or sheet from raw material.

X-Ray Gages are for heavy-duty work in steel mills. Gages are available for measuring thickness of hot strip from .040 to 190 mild steel; of cold strip, from .005 to .040 mild steel. Write for GEC-471.

The Beta-Ray Gage is a general-purpose device for measuring sheet or strip metals, paper, rubber, glass, textiles, and plastics weighing from 5 to 300 ounces per square yard. Write for GEC-485.

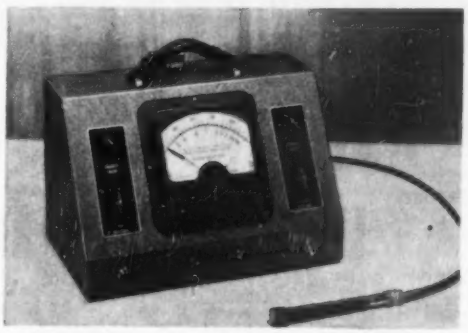
Beta-Ray Gage measures moving sheet or strips which are wet, sticky, highly polished, or soft.

G-E Thickness Gages, Types A and B
—*for measuring nonmagnetic materials*

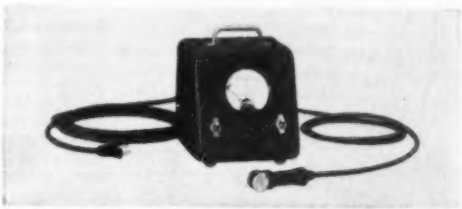
These gages help you to reduce scrap and rework expense by enabling you to spot quickly plating or coatings which are so thin that they do not meet specifications, or so thick that they waste materials.

The gages measure glass, plastics, paper, cellophane, mica, copper, brass, lead, and other nonmagnetic materials which can be placed over a magnetic reference plate.

Type A is for measuring the thickness of light plating; Type B, for heavy plating, or for bearing linings and paint. Write for GEC-319. Apparatus Dept., General Electric Company, Schenectady, New York.



Type A Gage is ideal for production-line use on jobs such as measuring thickness of copper plating on parts for electronic tubes.



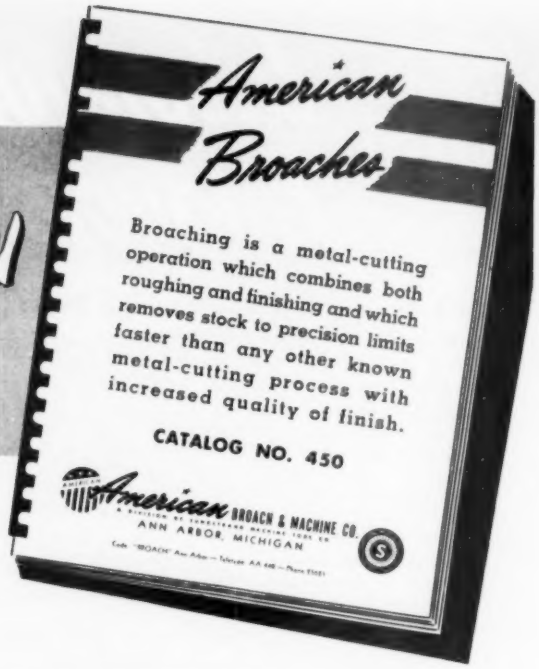
Type B Thickness Gage is a low-price, general purpose gage for measuring thickness of paints, heavy platings, bearing linings, Range: 0.0001 to 0.1 inch.

FOR HELP ON your measuring and testing problems . . . call the nearest G-E sales office

You Can Put Your Confidence In—

GENERAL ELECTRIC

NOW! Ready for you


American Broaches
Broaching is a metal-cutting operation which combines both roughing and finishing and which removes stock to precision limits faster than any other known metal-cutting process with increased quality of finish.
CATALOG NO. 450
American BROACH & MACHINE CO.
ANN ARBOR, MICHIGAN

The NEW American Broach CATALOG NUMBER 450

Thirty-Two Pages of PRACTICAL, USEFUL INFORMATION and ENGINEERING DATA

Partial List of CONTENTS

- Typical Broached Parts
- Broach Design
- Internal Broaches
- Surface Broaches
- Broach Pullers
- Keyway Broaching
- Resharpening
- Care of Broaches
- Broaching Machines
- Internal Broaching
- Surface Broaching
- Fixtures

Yours for the asking! This new manual of broach information is a valuable engineering aid. It contains dozens of photographs and blueprint drawings that will serve to outline the numerous ways broaching can cut production costs.

Designed For Easy Use —American Broaches — Catalog Number 450 is divided into two sections. Section I describes broaches of various type for internal or surface broaching. It also includes push and pull heads, resharpening information, tips on handling and complete terminology. Section II is a pictorial demonstration of twenty different types of broaching case histories with interesting production figures. Also a complete table of standard American keyway broaches.

Ask For Your Copy *Write today for your free copy. (On your company letterhead, please.) Ask for Catalog No. 450*

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Phone Whitehall 4-4336

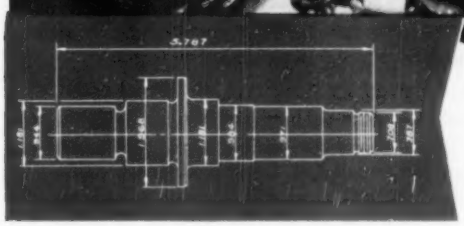
AMERICAN

American BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

See *American* First—for the Best in Broaching Tools, Broaching Machines, Special Machinery



CLEVELAND DIALMATIC QUICKLY REMOVES 3¾ POUNDS OF METAL TO FORM THIS 5.78" LONG SHAFT!

50 mm round SAE X-1315 crs bar stock is first boxmilled to .971" diam. x 2.815" length. The piece is then formed by front and rear cross slides, steadying from the turret. The shaft is threaded by turret and cut-off is made by the independent cut-off attachment. 8 diameters, 3 chamfers, 3 necks and 2 radii are formed on the piece.

For shops having an occasional chucking job to run in addition to bar work, the range of usefulness of the Dialmatic Cleveland can be *doubled* by being quickly and easily converted to a *chucking automatic*. All that is required is the substitution of a simple, low-cost chucking attachment for the stock feed mechanism in the spindle.

Here's another example of a good job being done in good time by the Cleveland Model "AB" Dialmatic. This new 2½" Cleveland Single Spindle Automatic meets every requirement a modern machine tool must possess for fast, accurate, *economical* production.

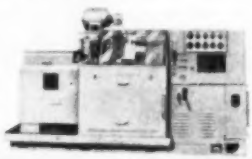
For example, it has a spindle speed range that no other single spindle of its capacity can match—from 24 to 1820 rpm! You can thread 2½" diam. alloy steel at 16 sfm—or work ⅞" free machining brass at 416 sfm—without a cam change!

High production at low cost is assured by speed of set-up and flexibility of control. Forward and return feeds for each of the five (or six, if desired) turret tool positions are *electrically* controlled. Feeds are simply set by positioning dials on the control panel. Front and rear cross slides are wide and rigid; have ample tooling area; operate smoothly, without vibration under heavy forming cuts—as demonstrated by the above job.

These and many more features in the Dialmatic Cleveland may make *more profits* possible for *your* production. To find out just how much, ask Camco engineers to submit a direct proposal, with production estimates on your work.

Remember, *Clevelands Cut Costs*

Cleveland Dialmatic, Model "AB" Single Spindle Automatic. For complete machine specifications, write for bulletins.



The Cleveland Automatic Machine Co. manufactures and stocks a complete line of STANDARD TOOLING and COLLETS for use with Cleveland Automatics. Prompt deliveries. Write for complete information.

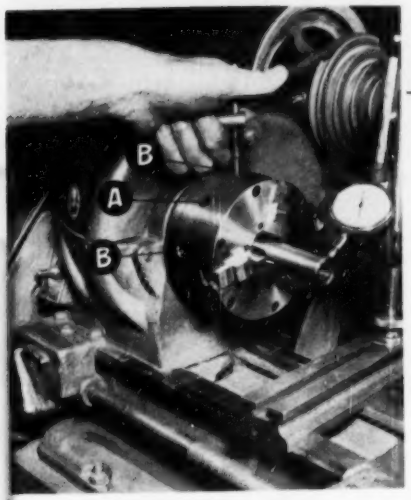
THE CLEVELAND AUTOMATIC MACHINE COMPANY

4928 Beech Street
Cincinnati 12, Ohio

SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
HARTFORD • NEWARK

Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

First Chuck Advance in 50 YEARS!!!



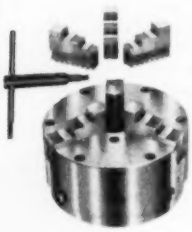
HOW THEY WORK

Pinion "A" moves jaws in or out to grip work like any scroll chuck. 4 opposed screws "B" bring the work to dead center. It's as easy as it sounds. (Men who have never used chucks before have centered work within .0005 in 3 minutes.) Once set dead true the same machining on duplicate parts (from two to hundreds) can be done without changing adjustment!

Buck AJUST-TRU CHUCKS

1. **.0005 Precision with scroll chuck speed!**
2. **Collet and Step-Collet functions at scroll chuck cost!**
3. **New 6 Jaw chucks end most needs for Stub Arbors and Mandrels!**
4. **Compensate for spindle run-out to lengthen useful life of old machines!**

Right at a time when the big push for production is on comes this revolutionary new idea in chucks to help win the battle. Here—at ordinary scroll chuck prices—are chucks that give you the precision of 4 Jaw chucks plus spindle collet capacity of ⅛" to 1½" by .001 *plus* step collet capacity of ⅛" to 5" (on 6" chucks) by .001. Think of the hundreds of dollars to be saved on machinists time, on collets, on stub arbors, mandrels, and special fixtures. But that is only part of the great news. Write today for illustrated literature with complete details.



3 STEP-JAW CHUCK

Now you can get .0005 precision on a 3 jaw chuck. No need for 4 jaws. Available in 4" 5", 6" diameters.

6 STEP-JAW COLLET CHUCK

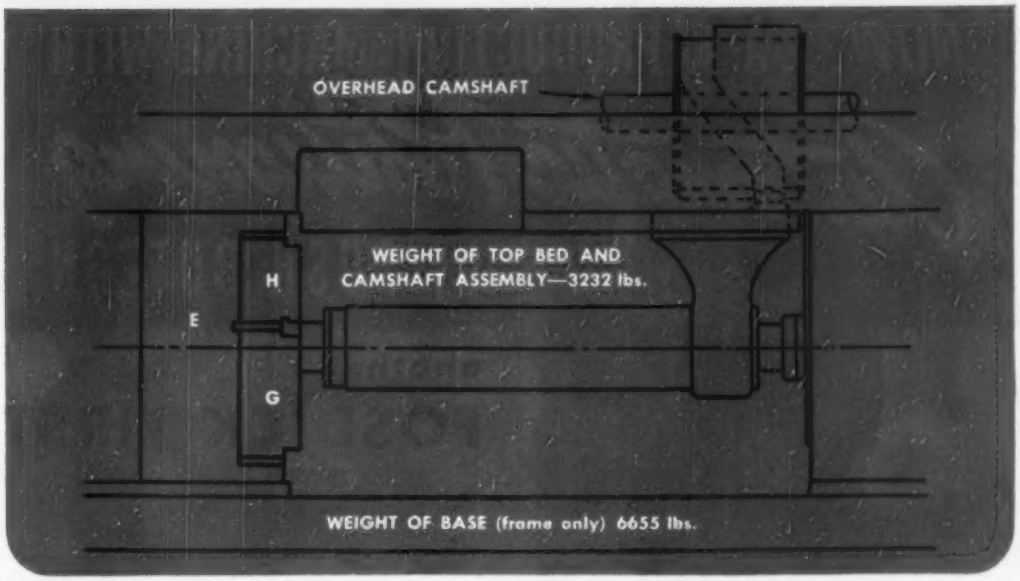
Centers work easier and quicker. Grips soft metals and tubes with less pressure. Holds bar stock firmer. It takes $1,000 worth of other equipment to equal the work capacity of this chuck.

6 JAW PRODUCTION COLLET CHUCK

For faster production on repeat external gripping operations.

Buck AJUST-TRU CHUCKS

BUCK TOOL COMPANY • 910 Schippers Lane, Kalamazoo, Mich.



PROFITS BEGIN WITH GOOD BUYING

Machine selection is often the difference between profit and loss, and the choice of one brand over another can be a vital decision. A machine that is not put to its best use is theoretically idle. A poor selection takes toll of all brands of the same type through greater sales resistance and cost. The information prepared for better machine selection before the purchase should be as thorough and useful as that of the operation and maintenance hand books supplied after.

The information given above and below is useful in determining the facility of the 1½" Six Spindle CONOMATIC MAIN CROSS SLIDES:

1. **They have never been equalled for dependable, low cost operation and maintenance in the handling of wide, heavy, form cuts.**

The four, rectangular, box type, CROSS SLIDES, H and G, on front and rear sides of the machine, are nickel moly iron normalized. Their total weight is 296 lbs. They are held in axial position by retaining gibs against the finished wall surface of the machine frame support. They are held in parallel, radial position by their top and bottom flat bearing surfaces with tapered gib adjustment. The total area of their radial bearings, alone, is 444½ square inches.

2. **They have a higher maximum load recommendation than do the cross slides of other "automatics."**

The maximum load recommendation for each MAIN CROSS SLIDE is 3200 ft. lbs. The short (22" high) 11¾" by 44" Frame Support, E, weighs 802 lbs. net. It holds the slides between, and in close proximity to, nearly FIVE TONS of "bridged" construction.

Buyer's Comparison Chart will guide you to full information

A Comparison of ALL Automatics is in Favor of Cone

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

NOW... A REPRODUCTION MACHINE WITH *Automatic Positioning* by PUSH BUTTON

another... FOSDICK FIRST

Precision boring and drilling coupled with fast *Automatic Push-Button Positioning* . . . entirely new machine flexibility for speed and accuracy in boring, drilling and tapping duplicate parts.

With this new No. 42P, *automatic table positioning* to plus or minus .0001" accuracy is accomplished simply by pressing a button on the Push Button panel conveniently located at operator's position. Two electrical cycles then quickly bring table to the desired position. Push buttons for rapid traverse in and out, right and left, also are provided which are operated simultaneously. Safety switches protect the machine in all directions.

To improve or modernize your operation and reduce cost on duplicate parts, investigate this Fosdick No. 42P with *Automatic Push-Button control.*

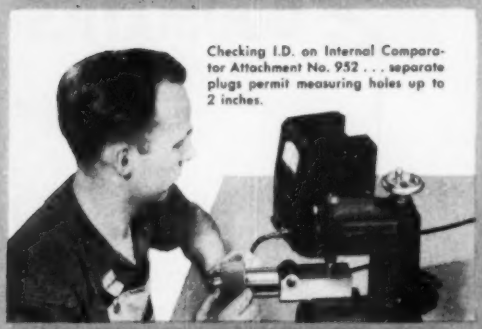
YOU CAN NOW POSITION THE TABLE TO PLUS OR MINUS .0001" BY MEANS OF ELECTRIC PUSH BUTTONS LOCATED AT OPERATOR'S POSITION

FOLDER AND COMPLETE CATALOG - NO. AMJP—ON REQUEST

FOSDICK MACHINE TOOL *Company*

CINCINNATI 23, OHIO

This versatile electronic measuring equipment PAYS ITS WAY IN MANY WAYS



Checking I.D. on Internal Comparator Attachment No. 952 . . . separate plugs permit measuring holes up to 2 inches.

Checking O.D. with External Comparator No. 931, and Amplifier No. 950 mounted on Signal Light Attachment No. 958.

Checking an inside micrometer to a high degree of accuracy with Gage Head Cartridge No. 953 in fixture

Checking gage size with Gage Head Cartridge. Complete freedom from differences in "touch" of different operators.

With this equipment, you can gage a variety of small precision parts on a mass production scale so fast and so accurately that costs drop. No special skill needed. Savings over slower, more tedious methods quickly pay for this equipment.

When used as a part of a Quality Control Program, this Brown & Sharpe Electronic Equipment offers even greater savings. It permits closer, faster coordination of inspection with production . . . making possible a substantial reduction in rejects, wasted time and effort.

This modern gaging equipment is designed and constructed with characteristic Brown & Sharpe precision. For complete information on its unique features, write Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

UNIQUE FEATURES

- Separate amplifier isolates heat-producing elements.
- True linear response permits accurate setting for entire scale with only 1 master block.
- Single amplifier may be used to serve several testing instruments.
- Normal line voltage fluctuations do not affect readings.
- Simple turn of graduation selector provides accurate readings in any desired increment from .0001" to .00001".
- Simple, self-checking device on external comparator . . . no gage blocks needed.

We urge buying through the Distributor

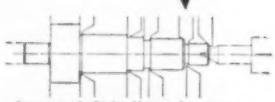
BROWN & SHARPE

ONE MAN OPERATES 2 DUOMATICS

LODGE & SHIPLEY Duomatic productivity is illustrated in this typical automotive set-up. The operator starts the first Duomatic on its cycle. While this machine operates automatically, the same operator easily handles a cycle on the other Duomatic. Production *flows* from both 2A Duomatics!

The low-cost, precision production of Lodge & Shipley 2A Duomatics is a valuable weapon in the fight against mounting costs. Are *your* lathes operating profitably? Lathes only a few years old may be badly outmoded when compared with new Duomatics *on a productive basis.*

- ★ Turn and bore with front and rear tool slides.
- ★ Swivel tool slides for angular facing and turning.
- ★ Simplicity of set-up reduces set-up time.
- ★ NO CAMS REQUIRED for automatic cycle.
- ★ Ideal for long or short runs.
- ★ Easily handled by unskilled operator.
- ★ New hardened steel bedways and cross slide ways—add years of life.



Duomatic At Right: *Floor-to-floor time: 35 seconds; Nine tools turning SAE 8620 steel.*

Duomatic At Left: *Floor - to - floor time: 45 seconds; Four tools turning SAE 8620 steel.*

Let a Lodge & Shipley Representative show you! Write for 2A Duomatic Bulletin No. 635.

THE **Lodge & Shipley** COMPANY

MACHINE TOOL DIVISION • 3055 COLERAIN
CHOREMASTER DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO

WISH OUR WEST COAST PLANT COULD STANDARDIZE ON CUTTING TOOLS. IT SURE HAS SAVED US MONEY AND SPEEDED PRODUCTION HERE.
* Standard Tool Co. District Warehouses
Red Shield
WHY NOT, BOSS? STANDARD SHIELD BRAND TOOLS ARE AVAILABLE COAST TO COAST. THEY HAVE A NEW SAN FRANCISCO BRANCH.

STANDARD MEANS *Service*

Investigate the time and cost savings that can be realized in your operation by using Standard Shield Brand Tools.

Complete Service Stock—that saves your time. Over 10,000 items carried in stock—supplied by warehouses in principal cities coast to coast. Solves your purchasing problems.

Foremost Quality—that reduces your costs—because of unexcelled design, material and workmanship.

Reliable Performance—that speeds your production. Proved because Shield Brand Tools have been specified and used in every industry since 1881.

Call your Industrial Supply Distributor for prompt, accurate and reliable service.

STANDARD TOOL CO. CLEVELAND 4, OHIO

STANDARD TOOL CO.

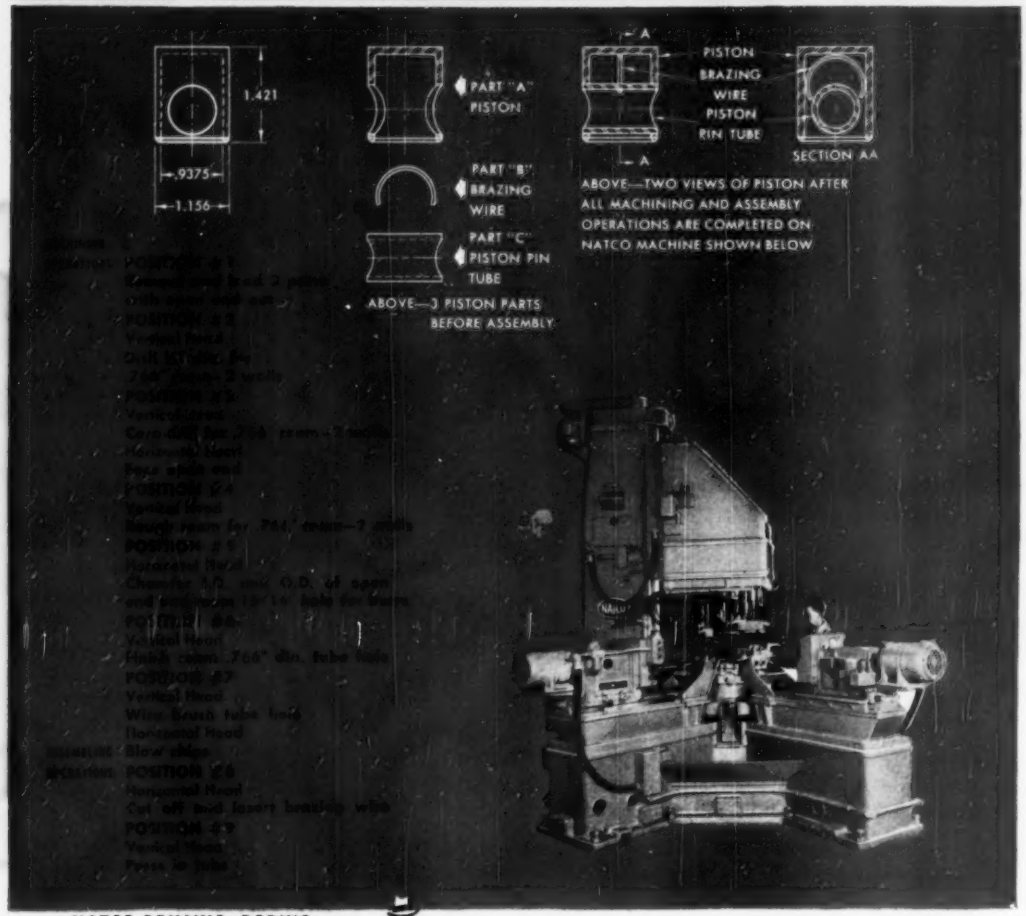
New York • Detroit • Chicago • San Francisco

THE STANDARD LINE: ***Drills • Reamers • Taps • Dies • Milling Cutters • End Mills • Hobs • Counterbores • Special Tools***

MACHINES AND ASSEMBLES

three parts automatically to complete

248 Refrigerator Pistons Per Hour



NATCO DRILLING, BORING, TAPPING AND FACING MACHINES

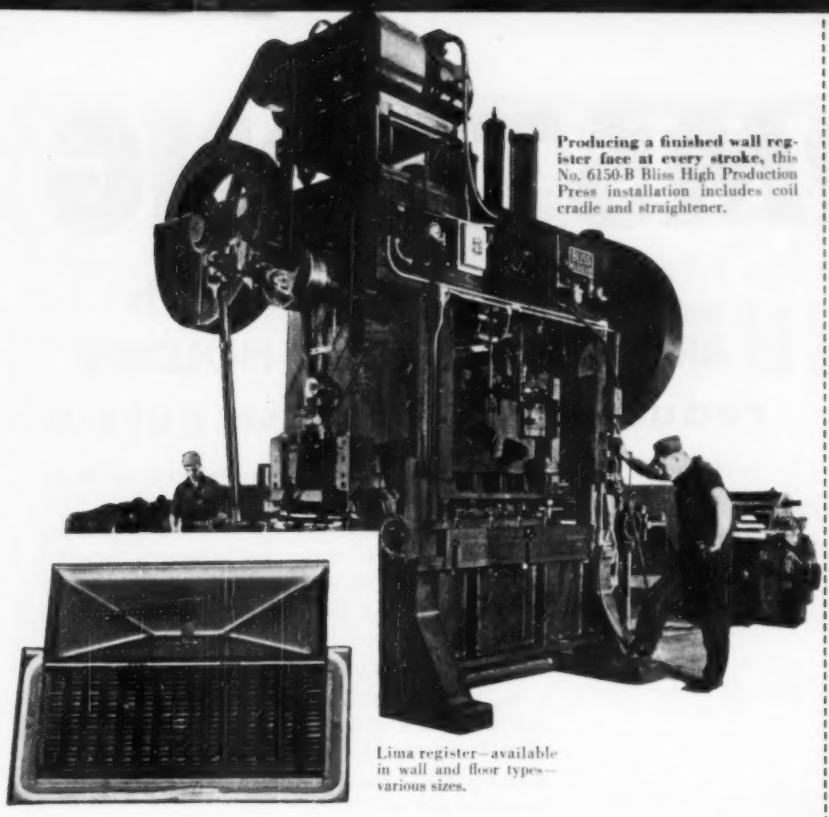
NATCO

Call a Natco Field Engineer

This NATCO four-way vertical and horizontal drilling machine is just one of the many examples of the way NATCO contributes to higher production and lowered costs for industry. Send us your drilling, boring, tapping or facing problems . . . our engineers have the solution.

Write for NATCO "Success Story" No. 5
Dept. AM

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Ind., U. S. A.
Branch Offices: 1809 Engineering Bldg., Chicago • 409 New Center Bldg., Detroit • 1807 Elmwood Ave., Buffalo • 2902 Commerce Bldg., New York City



Producing a finished wall register face at every stroke, this No. 6150-B Bliss High Production Press installation includes coil cradle and straightener.

Lima register—available in wall and floor types—various sizes.

5 Bliss Automatic Presses at Lima Register Co. equal output of 65 hand-fed

COST OF VALVE IS 1/25th THAT OF HAND-FED PART

It's a fact! In choosing equipment and methods to produce stampings for the famous Lima Register, Bliss and Lima engineers agreed that 5 Bliss presses set up for automatic operation would equal the output of 65 hand-fed presses.

Now, 18 months later, the plant is in full production and the 5 Bliss presses are turning out all the stampings required.

Two Bliss High Production Presses with progressive dies and Bliss coil cradles handle the bulk of the production. Stamping runs of 15,000 or more are assigned to these presses. Bliss Inclinable Presses with roll feeds are exactly suited for the production of a variety of small-lot stampings.

An example of the unusual savings achieved by Lima is the floor register valve. Formed complete—80 a minute—in a Bliss No. 675 High Production Press, it costs only 1/25th of a hand-fed stamping.

Similarly, high savings are obtained on all stampings produced on Bliss automatic presses.

If your stamping runs are 50,000 or more ask Bliss engineers how High Production Presses can increase your profits. Your nearest Bliss representative will be glad to talk about converting your hand-fed stampings to automatic operation.

E. W. BLISS COMPANY, TOLEDO 7, OHIO

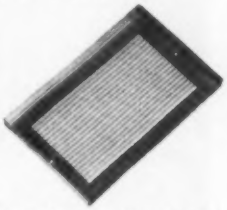
Valve for floor register...80 per minute...20 gauge steel...675 Bliss High Production Press.

Body slide...80 per minute...20 gauge steel...675 Bliss High Production Press.

Short border...75 per minute...16 gauge steel...6150 Bliss High Production Press.

Sliding channel...100 a minute ...20 gauge steel...675 Bliss High Production Press.

Hinge angle...100 a minute...20 gauge steel...675 Bliss High Production Press.



Cold air face...40 a minute... blanked on 6150 Bliss High Production Press; formed on 21½ Bliss Inclinable Press.

Chain clip...100 a minute...24 gauge steel...Bliss 21-B Inclinable Press.

BLISS BUILT · BLISS · CONSTRUCTED · TOLEDO

FROM THE RIGHT PRESS FOR A GIVEN JOB

...TO A COMPLETE PRESS ROOM...

It's Bliss

ARMSTRONG

Profit two ways with ARMSTRONG TOOL HOLDERS reduce cost–increase output

ARMSTRONG TOOL HOLDERS are *profitable* because they reduce overhead by saving while increasing output.

- Embodying the Armstrong Principle of an inserted cutter in a permanent drop forged shank or tool holder, they "Save: All Forging, 70% Grinding and 90% High Speed Steel."
- They save machine hours and man hours by permitting higher speeds and heavier feeds.
- They end costly delays for tooling up.
- They increase machining efficiency, for each has been carefully designed, is die perfect in form, is correct in cutting angle, in tool approach and clearance.
- They end tool breakage—have a wide safety factor of strength beyond need.

They reduce tool cost . . . each does the work of a complete set of forged tools and can be bought as needed from your local Industrial Distributor at prices so reasonable that no one can afford to make his own tools. Use the correct ARMSTRONG TOOL HOLDER for each operation on every lathe, planer, slotter, and shaper for increased production and profit.

Stocked by Leading Tool Departments

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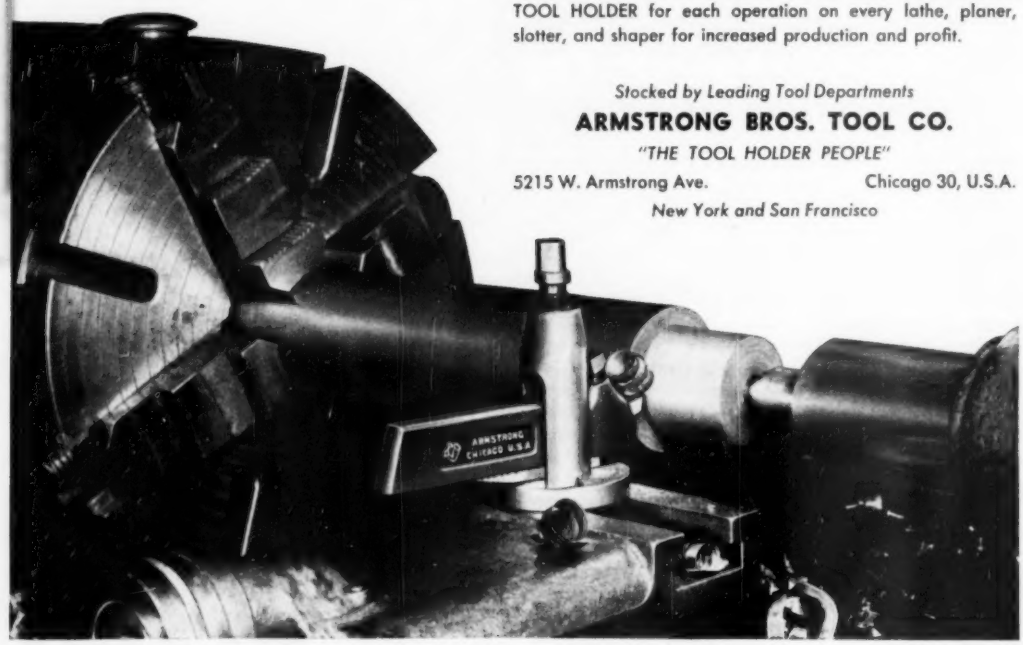
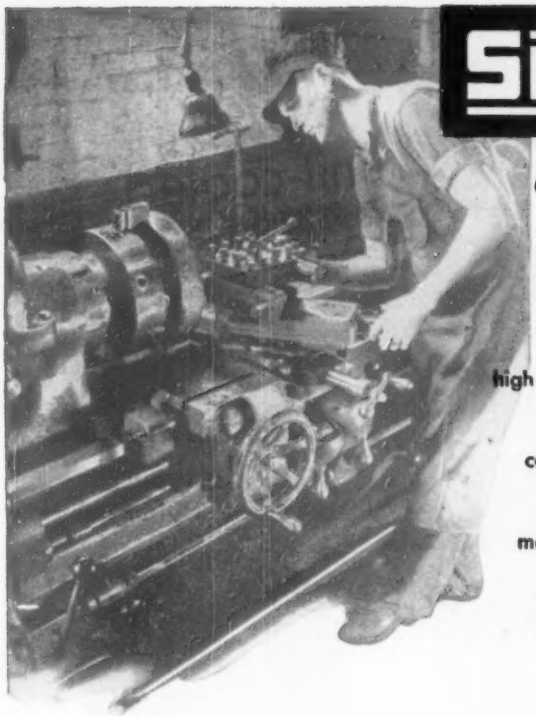


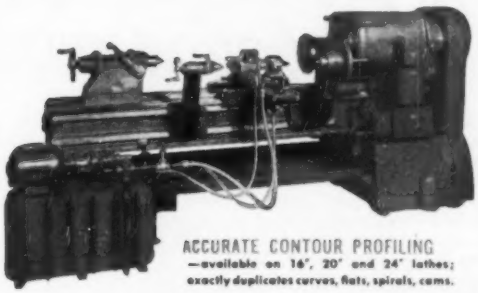


SPRINGFIELD

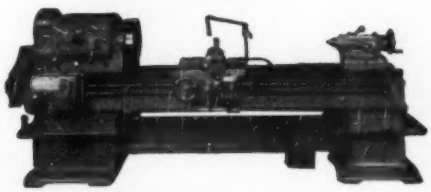
Geared Head
LATHES

Springfield builds a complete line of precision, high quality, geared head lathes. Every type of lathe built by Springfield is especially designed and constructed to meet all the requirements of modern tooling, and to retain extreme accuracy through many years of full capacity production.

Write for catalogs and detailed specifications.

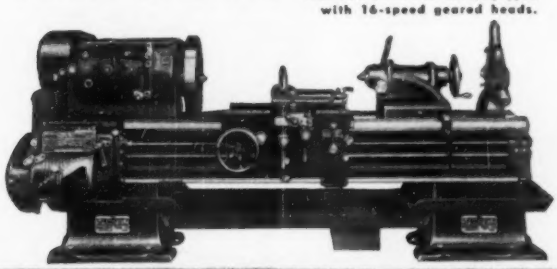


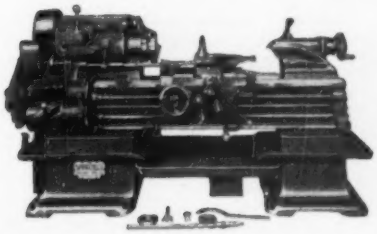
ACCURATE CONTOUR PROFILING
—available on 16", 20" and 24" lathes; exactly duplicates curves, flats, spirals, cams.



MANUFACTURING LATHE
—with unusually wide applications; capable of accurately turning, boring and facing.

SUPER DUTY LATHES
—made in 20" and 22" sizes; equipped with 16-speed geared heads.





TOOL ROOM LATHES
—made in all sizes including 24"; equipped with lead screw reversing mechanisms.

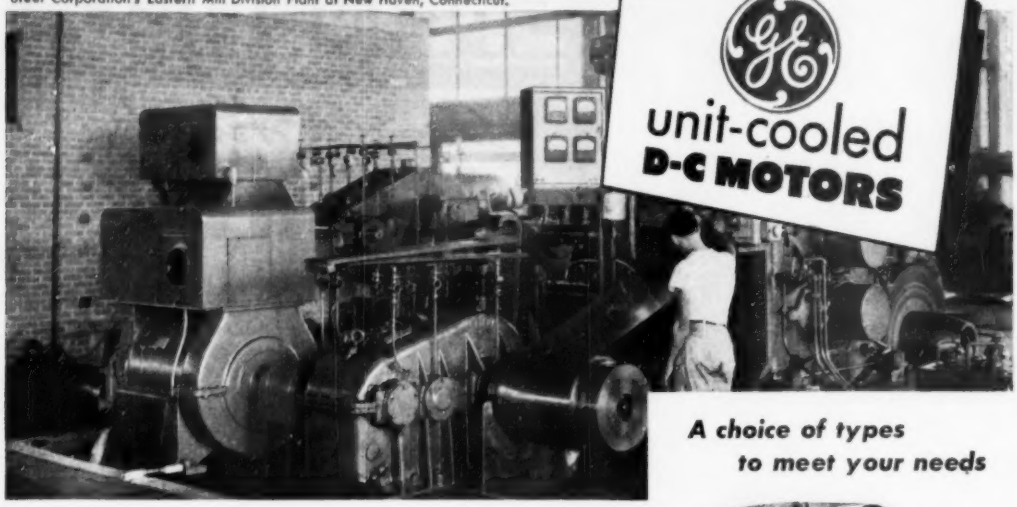
THE SPRINGFIELD MACHINE TOOL COMPANY

SPRINGFIELD, OHIO, U. S. A.

GENERAL DISTRIBUTORS: BRYANT MACHINERY & ENGINEERING COMPANY, 400 WEST MADISON ST., CHICAGO 6

Exclusive Representatives in All Principal Cities

The two G-E double-blower unit-cooled d-c motors shown at left, each rated 100 hp, operate the main drive and reel on a single-stand 2-high skin-pass mill, installed at Detroit Steel Corporation's Eastern Mill Division Plant at New Haven, Connecticut.



self-protected...to cut installation costs!

In dusty, dirty or oil-laden atmospheres—where open motors can't take it without special protection—you can cut installation time and costs to a minimum with General Electric totally-enclosed unit-cooled d-c motors. Motor and unit cooler, completely factory-assembled as a unit, come to you ready to install. They need no specially-built motor room, no piping, ductwork, coolant, filters or pressurized air supply. You simplify plant layout, save extra equipment cost!!

These better-protected, better-cooled G-E motors—available in ratings from 15 to 200 hp—also

. . . **minimize inspection shutdowns!** Windings, brushes and brush rigging are kept clean at all times because harmful air-borne materials can't get into the motor's internal ventilating air.

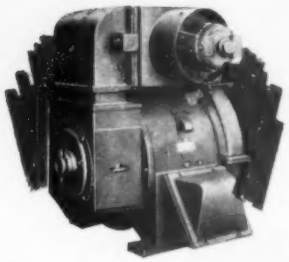
. . . **reduce power cost!** Because motor heat is rapidly dissipated, power consumption is less, especially in wide-range adjustable-speed motors.

. . . **simplify maintenance!** Large openings in the commutator end shield make it easy to get at commutator, brushes, and brush rigging.

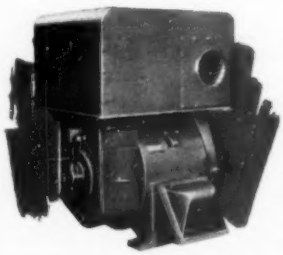
. . . **save mounting time!** Interchanging of motors to meet changing mill conditions takes less time because G-E totally-enclosed motors have the same mounting dimensions as G-E open motors of the same ratings.

Get the whole story! Ask your G-E representative how these sturdy, protected motors can help trim operating costs in *your* mill, or send for Bulletin GEA-4469. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

A choice of types to meet your needs



In single-blower type— for constant and adjustable speed operation at normal speed—unit cooler circulates internal air with a shaft-driven fan. External air is forced through alternate air passages by a separate motor-driven blower.



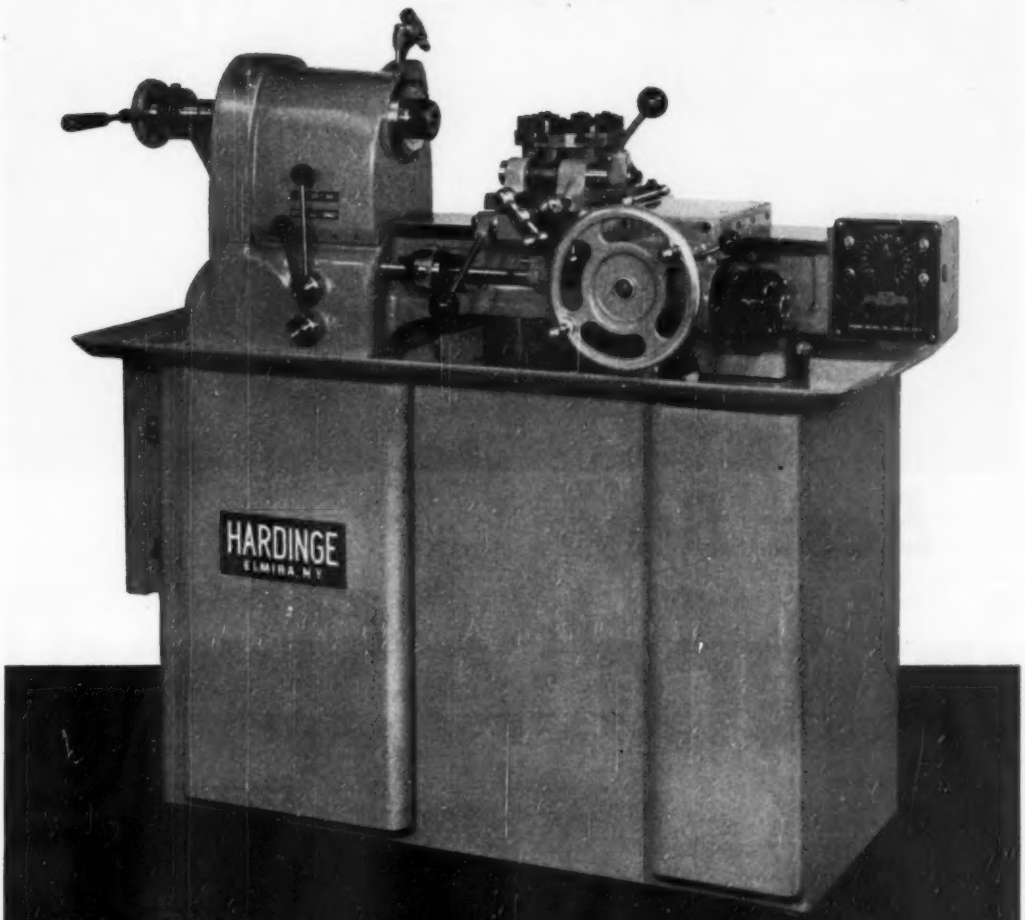
New double-blower type— can be operated continuously without harmful overheating, even at very low speeds. A single Tri-Clad® auxiliary induction motor drives both blowers, one for internal motor air, the other for external cooling air.

GENERAL ELECTRIC

770-18

HARDINGE
ELMIRA, N.Y.

HIGH SPEED CHUCKING MACHINE



This machine is an Essential for lowering Manufacturing Costs

Write for Bulletin HC

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE

Offices in principal cities. Export Office 269 Lafayette St., New York 12, N. Y.

Best Buy in Variable Speed!

COMPARE THESE FEATURES of *Vari-Pitch* Automatic sheave with any other variable speed drive and see why *Vari-Pitch* Automatic drive gives you more for your drive dollar.

1. Changes speeds with one hand while machine is running.
2. All mechanism is inside one sheave actuated by movement of the motor base.
3. Ample capacity and safety factor of multiple belts.
4. Full range of sizes from 1 to 40 hp.
5. Top speed is 100% higher than low speed.
6. Quiet operation.
7. Cushioned start.
8. Simple design and easy installation make cost low
9. Occupies no more space than ordinary sheave.

Vari-Pitch Automatic drive will pay for itself very quickly in increased production, improved quality and more flexible operation on many machines in your plant. Ask your Allis-Chalmers Authorized Dealer or Sales Office representative to give you savings and cost figures on your operations. Or write for bulletin 20B7223.

ALLIS-CHALMERS, 999A SO. 70 ST.
MILWAUKEE, WIS.

Vari-Pitch and *Texrope* are Allis-Chalmers trademarks. A-3063

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

ALLIS-CHALMERS

I-T-E removes oil, dirt, sand and filings . . . easily and quickly . . . with VAPOR DEGREASING

Large circuit breaker housings are clean and dry—ready for further handling—after vapor degreasing.

Speedy, trouble-free cleaning of a wide range of brass, copper, bronze, iron and steel parts . . . that's the 12-year performance record of vapor degreasing with trichlorethylene at the Philadelphia plant of the I-T-E Circuit Breaker Company.

Small stampings thoroughly cleaned.

The springs, nuts, bolts, washers, switch parts and housings I-T-E manufactures for its circuit breakers and switch gears must be thoroughly cleaned before finishing and inspection, and after burring and sanding. To do this job simply and economically, I-T-E uses three vapor degreasers, one of which has been in service since 1937. These units deliver the parts clean, warm, and dry . . . ready for inspection or further processing.

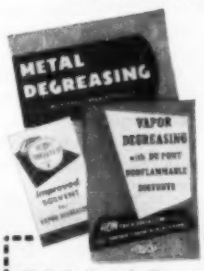
This modern method of cleaning has fitted in perfectly with the high-speed flow of production at I-T-E. For your plant, too, the installation of vapor degreasing may mean increased production and lower costs in metal cleaning.

USE DU PONT TRICHLORETHYLENE DEGREASING SOLVENT

Thousands of manufacturers are using Du Pont Trichlorethylene for vapor degreasing.

Under various trade marks, Du Pont degreasing solvents have been widely used for many years. These solvents are stable . . . the best yet developed by Du Pont for metal degreasing. They stand up against contaminating and destructive materials which may be introduced in degreasing . . . assist materially in carrying out efficient cleaning.

SEND FOR HELPFUL FREE LITERATURE



These three booklets will give you detailed information on the advantages of vapor degreasing, the equipment, industrial applications, and the Du Pont degreasing solvents.

Mail the coupon today!

non-
DU PONT *flammable* SOLVENTS for VAPOR DEGREASING

SOLD NATIONALLY THROUGH DISTRIBUTORS

DUPONT

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Dept., Wilmington 98, Del.

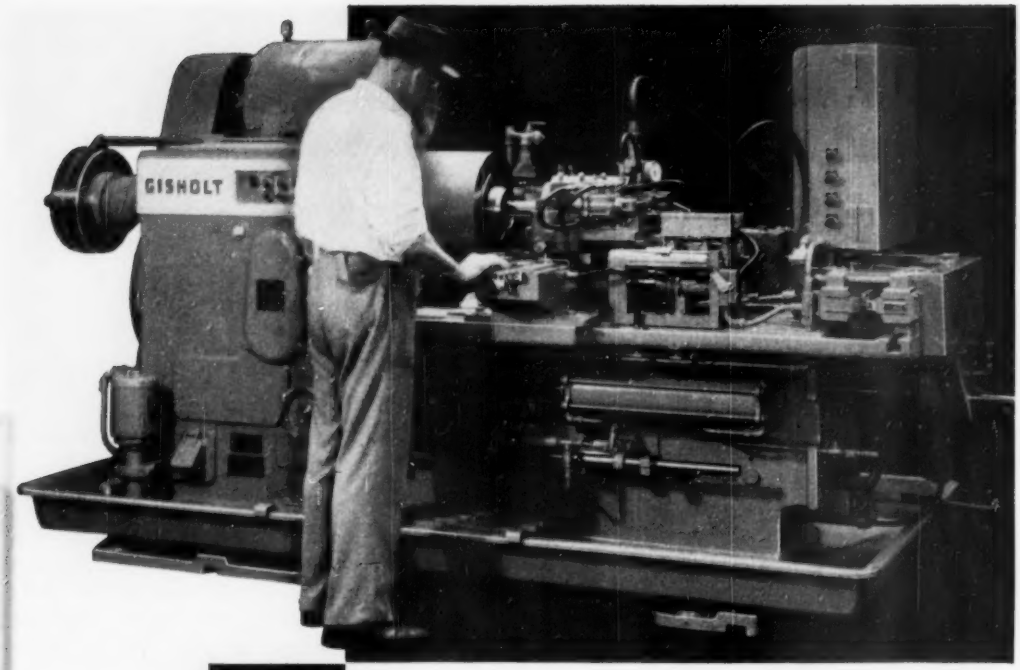
Please send me your free literature covering the vapor degreasing process and solvents. We are interested in cleaning _____ products.

Name _____ *Position* _____

Firm _____

Street & No. _____

City _____ *State* _____



HOW 8 SIMPLIMATICS

cut machine time 50%
cut man-hours 75%

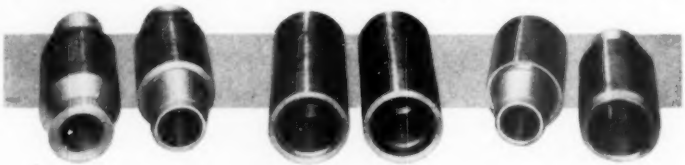
The way you can slash costs with the Gisholt Simplimatic often surprises some of the most experienced production men.

Here's a big shop which found that 8 Simplimatics could take over the job done on 16 other machines. And it takes only 4 operators instead of 16 to turn out the volume of parts required.

Not the least in the cost picture is the machine itself. For the basic Simplimatic design permits you to individualize the machine to a high degree to solve many different problems. Thus, for many jobs you can have all the advantages of a special machine merely with special tooling. Yet it's all done on a Standard Simplimatic—at far lower cost.

The importance of lower costs these days makes it important for you to get all the facts about Simplimatic Automatic Lathes.

The GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface finishing and balancing of round and partly round parts. Your problems are welcomed here.*



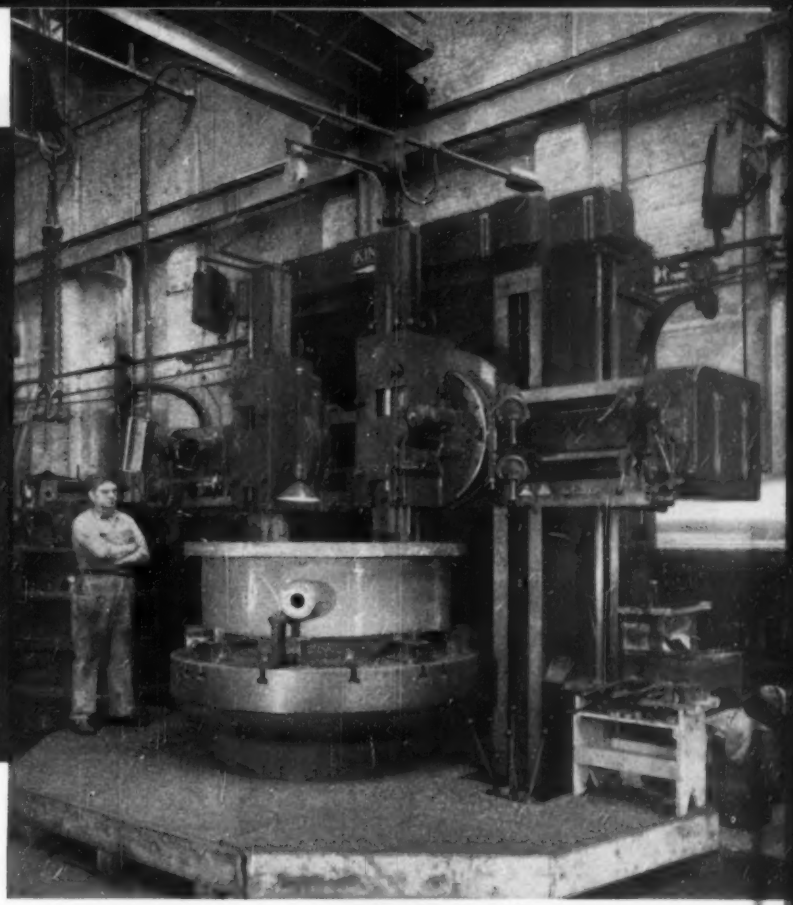
In producing these tool joint pins and boxes, the 8 Simplimatics work in pairs with fully automatic operation one man can easily tend two machines.

Ask about the many different arrangements possible on the Standard Simplimatics with platen table, vertical head, etc.

GISHOLT MACHINE COMPANY, *Madison 10, Wisconsin*

TURRET LATHES • AUTOMATIC LATHES • BALANCERS • SUPERFINISHERS • SPECIAL MACHINES

MACHINING TIME ON VALVE BODIES CUT 66 2/3%



— WITH NEW SERIES KING

"Machining time on chrome nickel iron butterfly valve bodies has been reduced from 9 hours to 3 hours, with much better accuracy and finish." That is the report of the Henry Pratt Company, Chicago, on the performance of their New Series 72" KING Vertical Boring & Turning Machine shown above. These are not unusual results—they are typical KING results. It's paying others to investigate "The KING Way". Maybe we can show similar savings on your jobs. Complete information available without obligation.

10 SIZES SINGLE COLUMN: 30", 36", 42"—DOUBLE COLUMN: 52", 62", 72", 84", 100", 120", 144". ALL SIZES ARE AVAILABLE IN A WIDE VARIETY OF HEAD COMBINATIONS, WITH OR WITHOUT SIDE HEAD.

SEND FOR NEW CATALOGS

New illustrated KING Catalogs give full description of machines and detailed specifications. Catalog K-1 features Machines sizes 30", 36", and 42"; K-2, sizes 52", 62", and 72"; K-3, sizes 84" and 100"; K-4, sizes 120" and 144". Catalogs requested will be sent promptly.

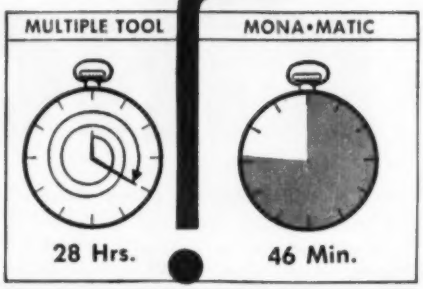
KING MACHINE TOOL DIVISION

CINCINNATI 29, OHIO

Builders of King Vertical Boring & Turning Machines and Sebastian Lathes

MONA•MATIC or Multiple Tooling Methods ..WHICH?

LET'S TALK SETUP TIME!



	Multiple Tool Automatics (Battery of Four)	Mona-Matics (Battery of Two)
Production	120/hour	160/hour
Cutting Tools	Cemented Carbide	Cemented Carbide
No. of Tools	40	4
Cost of Tools (including one replacement set)	$4220	$187
Setup Time	**28-30 hours**	**46 minutes**
Total Horsepower	80-120	40
Floor Space	150-200% more than Mona-Matics	
Subsequent Grinding Operations		50% less time than multiple tool

Would you rather spend *forty-six minutes* or *twenty-eight hours* tooling up for this production job? It's just as simple as that.

On the typical steering knuckle job detailed at the left, total setup time (four tools) on the two Mona-Matics is only forty-six minutes. The battery of *four* multiple tool automatics requires a total setup time of twenty-eight to thirty hours (forty tools)! And that does not include tool grinding, which takes many additional hours.

But bear in mind that reduced setup time is not the whole story of the Mona-Matic's outstanding ability to cut your costs. You'll save on production time, on tooling costs, on accuracy, on power consumption and on floor space, too. For the full facts on how Monarch's famous Mona-Matics will outperform any ordinary multiple tool machining method, write for Bulletin 1804.

COMPARATIVE CASE STUDY

Part—Steering Knuckle,
SAE 1045, turned section—5⅛" long, ¾" to 3" diameter

ACCURACY · ECONOMY · LONG LIFE

Monarch TURNING MACHINES

THE MONARCH MACHINE TOOL CO. Sidney, Ohio

LONG LIFE BETWEEN GRINDS

...without sacrifice of hole finish

Cleveland Reamers gave excellent results on the job pictured above, removing .012″ to .015″ stock in holes 1¾″ deep. Previously it had been a problem to maintain accurate hole size and good quality of finish in these "gummy" aluminum sand castings . . . but ***Cleveland*** High Speed Spiral Fluted Machine Reamers averaged *more than 1,000 pieces* without loss of finish, and with no appreciable wear on the tool. ◈ Once again it was proved that the *best* reamers are also the least expensive. Not only do ***Cleveland*** Reamers give longer life between grinds without sacrifice of hole finish, but they also reduce costly down-time on automatic machines. ◈ To make your own test, contact our nearest Stockroom or . . .

Telephone Your Industrial Supply Distributor

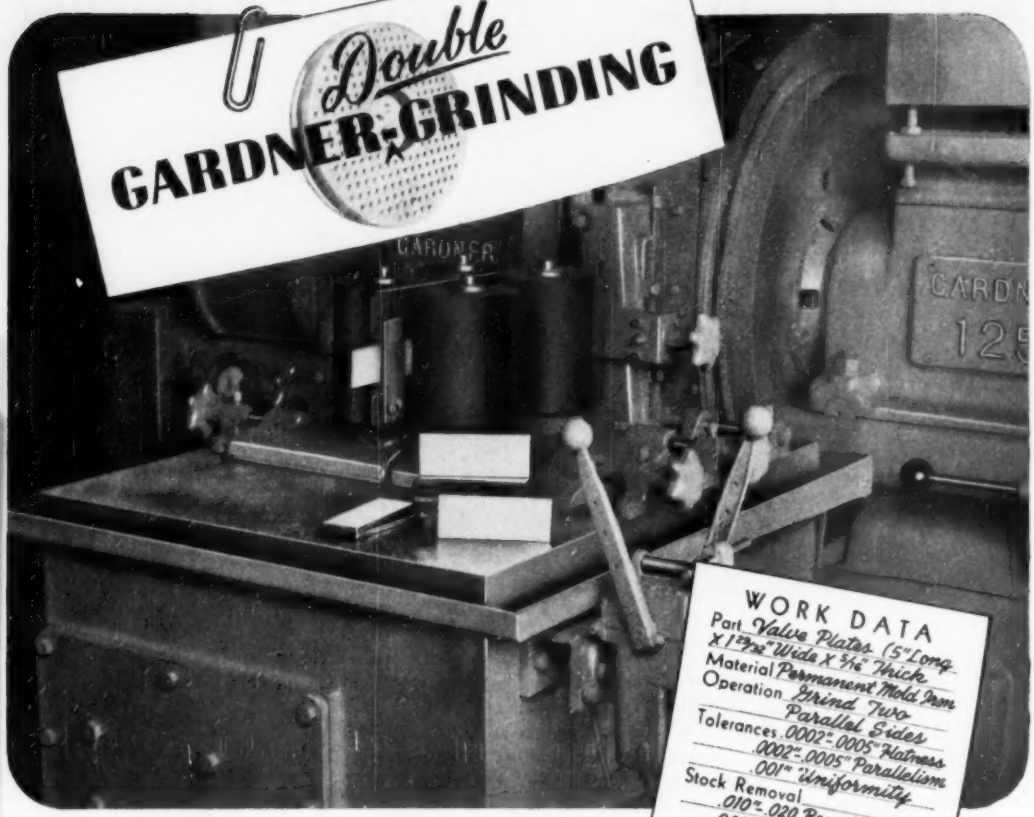
THE CLEVELAND TWIST DRILL CO.

1242 East 49th Street • Cleveland 14, Ohio

Stockrooms: New York 7 • Detroit 2 • Chicago 6 • Dallas 1 • San Francisco 5 • Los Angeles 58

E. P. Barrus, Ltd., London W. 3, England

ASK YOUR INDUSTRIAL SUPPLY DISTRIBUTOR FOR THESE AND OTHER ***Cleveland*** TOOLS



MAKES QUICK WORK of your TOUGH JOBS!

Grinding two parallel sides of these valve plates is an easy job for this No. 125-26" Gardner Double Grinder which handles BOTH surfaces at ONE setting. Even at the time-saving rate of 30 pieces per minute, close tolerances for flatness, parallelism and uniformity present no problem.

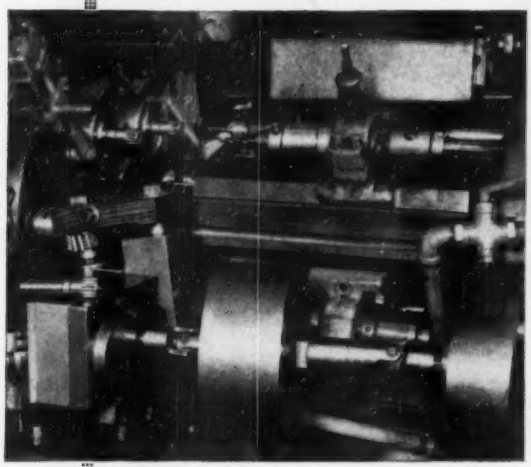
A Gardner DOUBLE Grinder may solve your parallel-surfacing problems. Let us show you HOW!

Ask for our DOUBLE-GRINDING Bulletin!

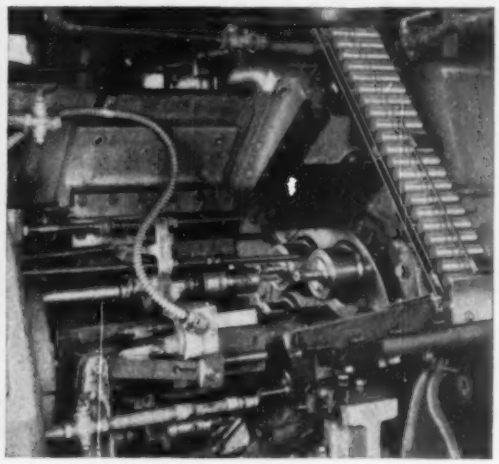
GARDNER MACHINE COMPANY

410 EAST GARDNER STREET . . . . BELOIT, WISCONSIN, U.S.A.

HOW TO SAVE ON SECOND OPERATION JOBS



Front tooling zone, Acme-Gridley bar automatic with special hobbing attachment for machining ratchet shafts.



Rear tooling zone, Acme-Gridley bar automatic with special magazine loader used in machining ratchet shafts.

JOB FACTS

Part—Ratchet Shaft 1 5/16" diameter x 3 7/8" long
Material—SAE 1112
Operations—6, including hob 12 serrations
Machine—Acme-Gridley 1¼" RA-6 spindle bar automatic with magazine loading
Machining Time—10.7 seconds per piece

Second operations can sop up a lot of production dollars—unless you handle them right.

The *right* way—the timesaving, money-saving way, is to put them on an Acme-Gridley. Its greater versatility permits the liberal use of independent, power-driven auxiliaries—that combine operations, reduce handling, and cut machine overhead.

Take the ratchet shaft job illustrated, for example. Instead of transferring the part to a hobbing machine after the second operation drilling and tapping has been performed, the twelve serrations are machined by a hobbing attachment. Result: one less machine, one less unloading and reloading operation. And magazine loading cuts man-hours and production time still farther.

Wide, open tooling zones, close-coupled camming, rigid construction and plenty of power pay off in more good pieces in the pan every time. These are the practical, dollar-saving kinds of results you can expect from every Acme-Gridley. May we give you more facts, stated specifically in terms of your own needs? No obligation, of course.

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley 4-6 and 8 Spindle Bar and Chucking Automatics • Single Spindle Automatics • Thread Rolling Machines Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Counters • Solenoids Centrifuges • Contract Manufacturing

HERE'S A TOUGH MULTIPLE-OPERATION PROBLEM

PERFORMS 3 OPERATIONS PER CYCLE—
Shearing, Riveting and Straightening
ON FORGED STEEL PARTS
at 35 Cycles per Minute

Solved by Elmes!

ELMES 100-TON
AUTOMATIC OPENSIDE PRESS

Moving platen, 18" x 16". 3" stroke. High and low pressure pump provides rapid advance, slower pressing speed and rapid return. Photo-electric safety control stops platen immediately if obstruction breaks light beam at entrance to dies. Accessible, fast, flexible. Sizes and capacities for all service needs.

For nearly a century, Elmes hydraulic specialists have been solving problems such as this one, brought to Elmes by a prominent manufacturer of farm implements. Each problem in turn has been met with the characteristic ingenuity that built the Elmes Press reputation for excellent performance.

Shearing, riveting and straightening forged steel work— *subject to variations in thickness*—on a single stroke of a press, call for proper application and accurate regulation of pressure. To meet these requirements, Elmes supplied the 100-ton Automatic Openside Press shown above—and turned several troublesome, costly procedures into one smooth, fast, profitable operation. This 3-way operation is being performed unfailingly at speeds up to 35 cycles per minute.

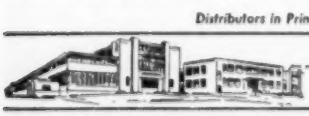
Why not put your pressing problems up to Elmes? Objective engineering, backed by many years of successful hydraulic experience, makes Elmes Presses right for each job. Our staff of specialists is at your service with suggestions, recommendations or cost estimates on existing press designs or new developments—without obligation on your part.

DO YOU HAVE THIS ELMES HYDRAULIC METAL-WORKING PRESS BULLETIN?

Covers single-action, double-action and triple-action presses; standard designs; special applications; automatic feeds. Your Elmes distributor can supply you, or request direct. Ask for Bulletin No. 1010B.

AMERICAN STEEL FOUNDRIES • ELMES ENGINEERING DIVISION

Distributors in Principal Industrial Centers — *Also Manufactured in Canada*



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METAL-WORKING PRESSES · PLASTIC-MOLDING PRESSES · EXTRUSION PRESSES · PUMPS · ACCUMULATORS · VALVES · ACCESSORIES

CONFIDENCE

When this operator pushes the button to make contact between these taps and the complicated casting he is about to thread, he will risk a huge investment in machinery and semi-finished product. For a fleeting moment the management, labor and engineering skill that made this cost reducing set up possible is completely dependent on the performance of these taps. A tremendous responsibility is theirs.

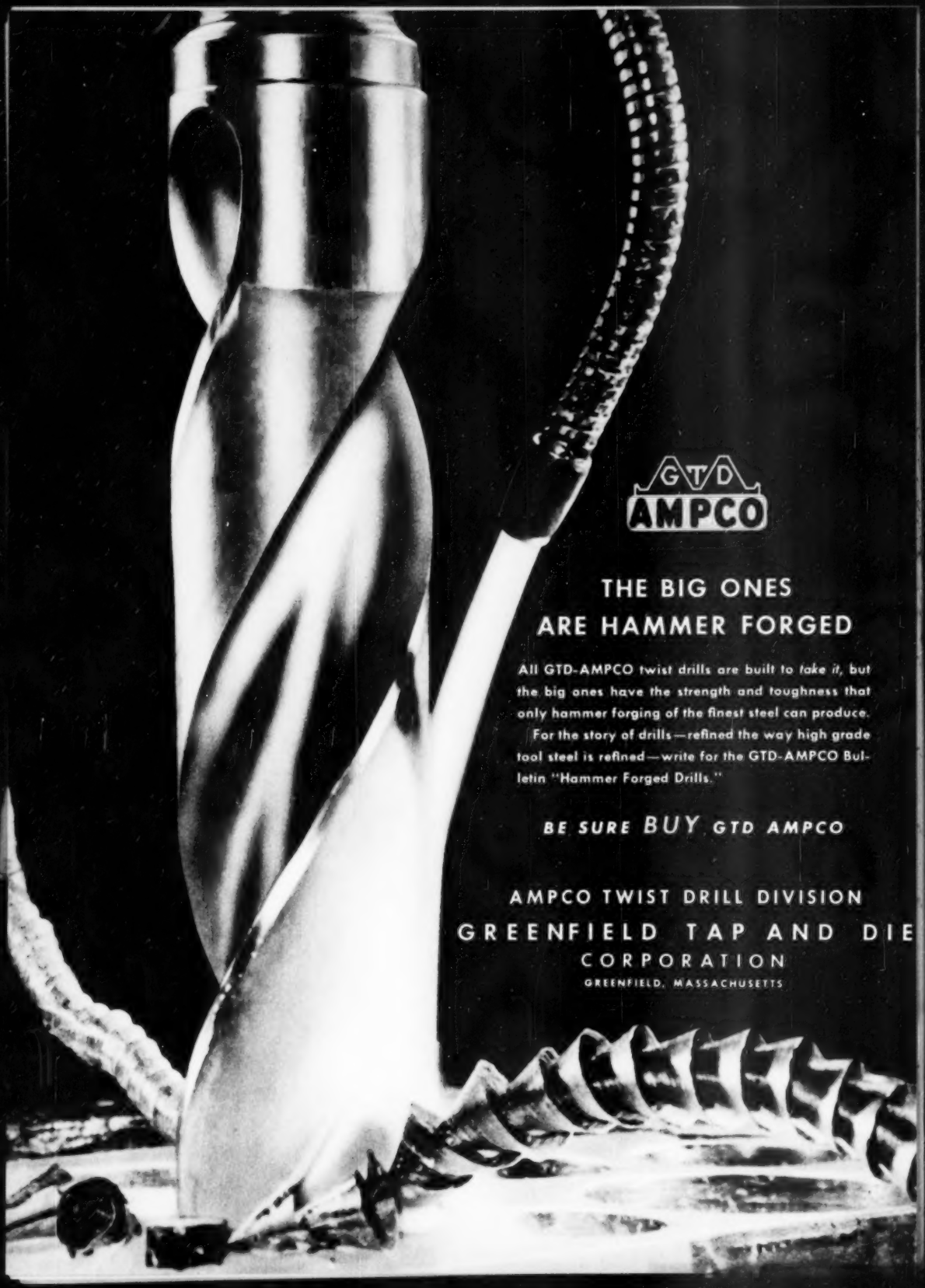
But with GREENFIELD TAPS in the spindles, this man will push the button with confidence.

BUY TAPS WITH *CONFIDENCE*

BUY *GREENFIELD* TAPS

GREENFIELD TAP AND DIE CORPORATION

GREENFIELD, MASSACHUSETTS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Now—for Walker-Turner 16" Band Saws

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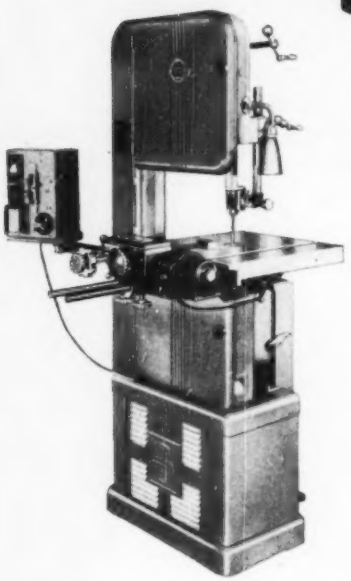

Latest example of how Walker-Turner *design* helps industry speed production . . . cut costs

Overload a metal-cutting band saw and what happens? Distortion . . . blade failure . . . work stoppage . . . expense! It can't happen here — on this new 16" Band Saw.

Walker-Turner Power Feed, a revolutionary machine development, gives you positive blade protection. Motor driven, and automatically controlled by the resistance encountered at the cutting edge, this exclusive new mechanism maintains a pre-set feeding pressure. Easily adjusted for blade condition and various types of material.

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IN REPLY PLEASE REFER TO

Sept. 23rd, 1949. Carl Pfeifer

Niagara Machine & Tool Works
637-697 Northland Avenue
Buffalo 11, N. Y.

Att: Mr. H. D. Rosenkrans

Gentlemen:

We are sending under separate cover a picture of our new Niagara Shearing Machine.

May we add, at this time, that we have been using your machines for over 60 years and still find that they are the best from our standpoint of view and experience. We have had several opportunities to change over but always come back to Niagara.

If you care to use our statement along with the photograph, please be free to do so.

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T. E. CONKLIN BRASS & COPPER CO. Inc.

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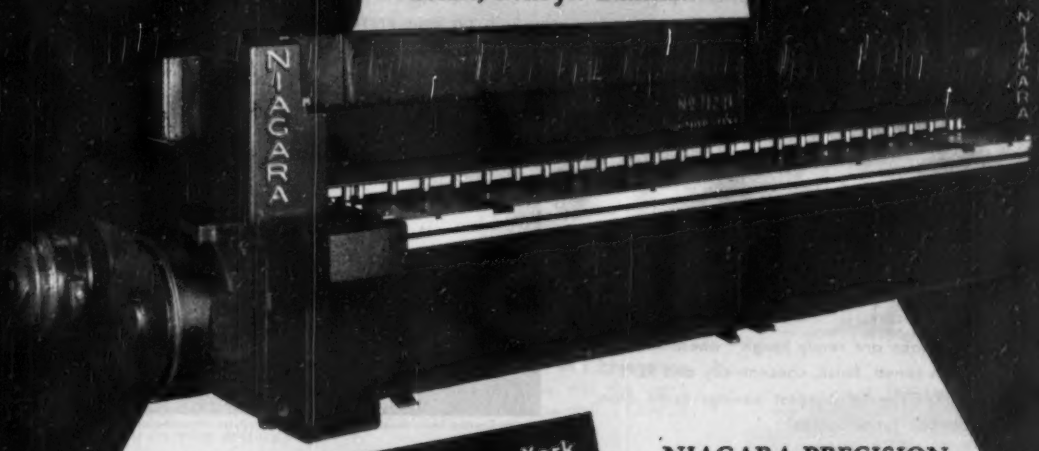

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He also knows that unless YOUR equipment and methods are "up-to-the-minute", YOU cannot continue to sell YOUR products at competitive prices.

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Rugged, dependable SPACEMASTER Electric Fork Trucks, a representative Lewis-Shepard product, require the highest standards of quality machining on their various components. Rapid production turning of tough alloy steel drive shafts and wheels—of precision steering gear housings and shafts—is a real test of turret lathe economy.

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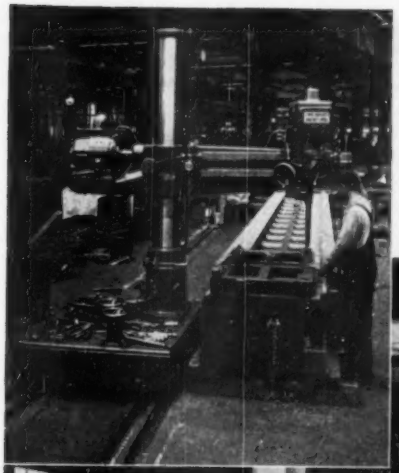
Are you equipped to your best advantage? Get a free check-up on your present operations. Write to our PRODUCTION RESEARCH DEPARTMENT for this service.

Photos Courtesy Lewis-Shepard Products, Inc., Watertown, Massachusetts

Turret Lathes—Fay Automatic Lathes—Thread Grinders—Optical Comparators—Threading Dies

JONES & LAMSON
MACHINE COMPANY
Springfield, Vermont, U.S.A.
MACHINE TOOL CRAFTSMEN SINCE 1835

VERSATILITY by BICKFORD



BICKFORD SUPER SERVICE RADIALS and BICKFORD ENGINEERING can Profit you!

This powerful Cincinnati Bickford Super Service Radial, with its balanced 10′ arm and 26″ diameter column, and modern "clear visibility" head, step saving, time saving centralized controls, special circular base, has brought a high efficiency to the job.

In contrast to this massive machine we show above the 9″ dia. col., 4′ arm Super Service Radial mounted on a track, and here again Bickford engineering and Bickford versatility have met the user's needs—and again given him high production at low cost. Consult us on your drilling problems.

Write for Bulletin No. R-22—on the 26″ column Super Service Radial—and Bulletin No. R-21B, covering the 9″ diam. column Super Service Radial.

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Radials 7½" dia. col. 2½' arm to 26" dia. col. 12' arm
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PRECISION STAMPINGS
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DIAMOND G STAMPINGS
CUT COSTS... TIME SAVE EQUIPMENT
Let our "know-how" and modern equipment save you dollars and time in getting metal stampings. We specialize in small and medium size stampings and produce them to precise specifications at minimum cost.
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...delivers them when you need them . . . where you need them.
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Backlash

Upside Down for 20 Years

Just to show you that I read AMERICAN MACHINIST, I am making reference to two pages in the July 24, 1950, number.

First, your good editorial entitled "Best Preventive Against Sneak Attack." May I add the thought that if you want to really cause alarm in Russia, you should tell them that United States industries had decided to convert all of their machine tools over ten years old into "scrapnel" for aerial shipment to Russia, and that these old clunkers will be replaced by modern machine tools.

Second, I am glad to note on page 147 that Dr. Frazer, our good friend at Union Twist, is in agreement with the Pratt & Whitney scheme of "upside-down drilling," as evidenced in our *1930* circular inclosed. The catalog on the 1950 model will soon be ready.

W. P. Kirk, Vice President
Pratt & Whitney
Div. Niles-Bement-Pond Co.
West Hartford, Connecticut

The circular sent by Mr. Kirk describes a 6-spindle, vertical deep-hole driller in which gun drills are held stationary as workslides lower the pieces over them.—Ed.

Dragging Brakes?

I read with great interest your article on "Are We Riding the Brakes in Machining Speeds?" (*AM* Aug. 7, 1950, p 190) and wonder whether you would be good enough to mail me reprints of it?

It just came to my attention that the Russians claim to have run "for the first time in the world" in 1939 extensive tests at super-high cutting speeds. They machined aluminum and bronze (milling) at cutting speeds between 21,000 and 27,500 fpm with the result that the milling cutters did not wear at all.

Max Kronenberg
Consulting Engineer
Cincinnati, Ohio

Urea Consumer

Having read the article on finishing plastics (*AM* April 17 '50, p100) and seeing that I was superintendent of the first contract shop in Britain to produce molds for Bakelite and kindred materials, a few remarks may not be out of place.

The original article dealt mainly with formaldehyde-phenol plastics. However, our product was composed of urea, or thiourea, which is based on the solid matter extracted from urine. Cups and beakers made of the plastic look attractive in the chain-store windows where they are sold. They are quite inert to all solvents except any of the many alcohols.

Here is a true incident from my case book:

I went to work temporarily for a firm producing moldings for the trade in London. The toolroom foreman there had known me previously, elsewhere. One day in conversation he remarked:

"You know something of the chemistry of plastics, don't you, Jim?"

"Yes," I replied, "I hope that I do."

He then told me that his daughter had brought home from the local Woolworth store a beaker marked "Beatl," and when Christmas came around he had some whiskey in it. He said it did taste funny!

When I told him that the spirits had dissolved a small layer of urine, and he had drunk it, he went a nasty green and remarked, "You abstainers never get any of these things down in your tummies?"

I might also mention that all dies *must* be made of stainless steel or they will rust up overnight.

J. P. Essex
Hove, England

We hate to kill a good yarn, but

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MICROHONE[b.] *

a. CONTROLLED SURFACE ROUGHNESS
Any desired surface roughness duplicated in every part

b. NO WAVINESS OR SURFACE IRREGULARITIES
A true geometrically-accurate surface with no high spots to break the lubricating film and cause high localized heat

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* SURFACE-FINISH SYMBOLS recommended by SAE Surface Finish Committee and its sponsor the American Standards Association.

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10" or 14"
TWIN WHEEL
WET OR DRY
TOOL GRINDER

For Carbide, Stellite, or High Speed Steel Tools.

one step from rough to finish grind

TYPE TD
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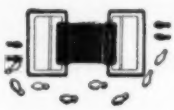
TWIN WHEEL
TOOL GRINDER
(ALSO SINGLE CUP WHEEL)

Heavy Duty
Wet or Dry
10"-14" Wheels



OLD WAY

Lost time between rough and finish grind.

Floor space wasted — Grinder must be away from wall.

NEW WAY

One step from rough to finish grind.

Conserve floor space — place Grinder against the wall.

POSITIVELY NO SPRAY OR SPLASH WHEN GRINDING WET!

See this machine in operation at the National Metal Exposition and Congress, Booth 2102, Oct. 23 to 27, Chicago, Ill.

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ALSO:

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ABRASIVE BELT MACHINERY
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THE STANDARD ELECTRICAL TOOL CO.
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just so nobody gets a bad opinion of plastics: urea is composed of a chemical structure similar to urine, but the source for the raw material is not the same. Mr. Essex suggests stainless for dies to mold urea. We'd like to suggest that monel alloys might do a good job, too, as well as some special grades of carbon steel.—Ed.

Peak Becomes Look

I have read the article on high-speed machining, and I believe that it will stimulate a lot of interest in the problem of higher cutting speeds. For some years I have felt that the cutting operation can be conducted "too cold" with particular reference to the temperature at the shear zone.

There is a point about which I should like to comment. On page 103, referring to our measured tool-chip interface temperatures, you state parenthetically that "Holm estimated the maximum temperature on high spots as 2.7 times this"—meaning the average tool-chip interface temperature. You probably got this information directly from Shaw's paper and it is in error. What Holm stated in substance is that where the temperature of sliding contact of different metals is measured by the thermocouple principle the measured temperature is not the maximum temperature but some average, and he relates the maximum temperature to average temperature as

$$\frac{\Theta \text{ max}}{\Theta \text{ avg}} = \frac{4}{\pi} = 1.27$$

This is substantially the same ratio given by Jaeger for rectangular contacts. Thus, Shaw's value should be 1.27 and not 2.7. At the St. Louis meeting Shaw told me that he was aware of this typographical error.

We feel that the average tool-chip interface temperature with a type 2 chip is about 80% of the peak temperature on the "high spots." This is in agreement with Jaeger and Holm.

At 600 sfpm we measured an average tool-chip interface temperature of 1502 F. This means a peak temperature of about 1875 F. If, however, as stated in the paper under discussion, the peak temperature is 2.7 times the average, we get a peak of about 4050 F, which is unreasonable both from the standpoint of the chip and the tool.

K. J. Trigger
Professor of Mechanical Engineering
University of Illinois
Urbana, Illinois

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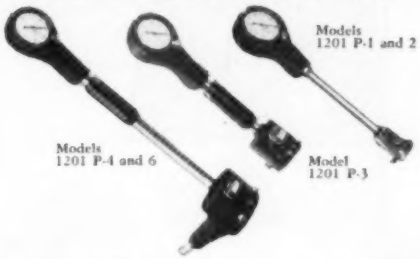

Six gages check any hole diameters from .500" to 12.665". These are precision gages, exceptionally sensitive and also very sturdy. Motion transfer mechanism is completely friction-free, can't be surpassed for durability and long-lasting accuracy. Model 1201 Hole Gages are self-centralizing . . . they give the speed and precision required in production industries today.

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Federal offers many modifications for checking every type of I.D. from very shallow counterbores to very deep holes. They are made with and without self-centralizing contacts.

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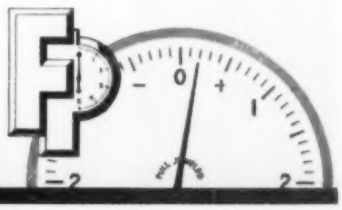

looking

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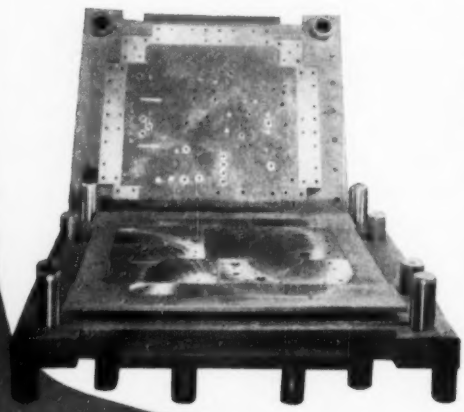

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SPOT NEWS of Metalworking

- **French have in prototype stage these weapons:** Leduc ramjet supersonic fighter; infrared telescope for night observation; guided missile capable of altitudes of 300 mi.; 6-wheeled Hotchkiss armored car carrying 75mm cannon and several heavy machine guns; Hotchkiss heavy airborne halftrack; high precision radar instrument for measuring initial velocity of projectiles; tiny portable radioactivity detector; super-powerful anti-vehicle and anti-personnel mines; and high precision Beaufort anti-aircraft gun.

- **Ford will build Pratt & Whitney R-4360 Wasp engines in former Dodge-Chicago plant** in Chicago where Machine Tool Show was held in 1948. These engines are largest reciprocating engines made and are used in B-36's and C-97's. Ford manufactured Pratt & Whitney engines at Rouge plant in last war.

- **Gas turbine engines for use in small harbor craft** have been ordered from Rover Company by British Admiralty. Engines will be smallest yet installed in ships, about same size as developed by Rover for gas turbine auto (A. M., Apr. 3, p175). Experiments aim chiefly at ease of maintenance. Gas turbines for warships are being considered as long-term possibility.

Ultrasonic soldering iron developed by Mullard Electronic Products Ltd. in England employs high-frequency vibration of soldering bit to break up refractory oxide film. No flux is required. Aluminum is readily soldered with tin-lead or tin-zinc solder.

- **Revolutionary method of making molds in shell form** from phenolic-silica plastic material is being developed experimentally by two large auto makers. Only grinding is necessary to finish the castings. Process may be used for crankshafts, with journals being finish ground.

- **Establishment of arms factory in South Africa** is being negotiated by Union government and private interests whose nationality is not disclosed. Purpose is to make small arms capable of meeting entire military and sporting needs of African continent. Among the weapons: automatic pistols, revolvers, sub-machine guns, rifles, shotguns, miniature sporting rifles.

Casting an entire airplane wing from magnesium is to be attempted by Northrop Aircraft on behalf of the Air Force. First step will be to cast outer half of wing in single piece. This will then be tested to determine its relative strength in comparison with aluminum sheet, strussed, conventional fabricated wing. Northrop hopes to obtain a structure free of porosity and made to very close tolerances.

- **Establishment of price controls on used machine tools** "to become effective at earliest possible date" has been recommended by board of directors of Machinery Dealers' National Association. Reason: rapid increases in prices the past few months. (See New Tooling, p87.)

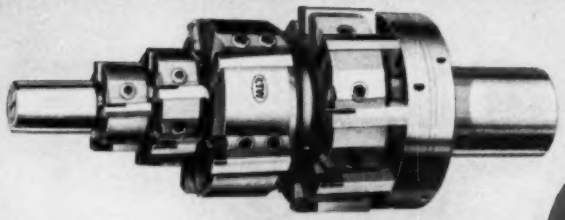
- **De Soto is now machining parts for new Chrysler V-8 engine** which may be introduced in 1951 cars. New engine is claimed to be most powerful in quality-car field.

- **Buick is reported to have an overhead valve V-8 engine ready for 1951 or 1952.** It is likely to be built in a brand-new engine plant, presumably at Flint.

- **Poland was French machine tool industry's No. 1 customer last year.** Shipments of standard machines to Poland totaled $2,198,000. Hungary and Czechoslovakia also were good customers. Orders from satellites are being taken by Italian machine tool builders. Italian shipyards are being kept open by Russian orders for diesel-powered ships.

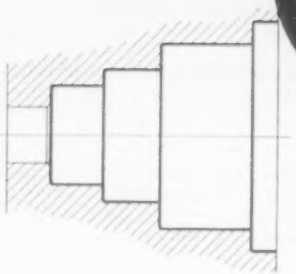
- **Cleveland steel user is paying $175 per ton plus freight for heavy sheet** which goes through following conversion process: ingots are shipped to Canada to be rolled into bars, after which bars are rolled into sheet on continuous mill in Pittsburgh district which has been leased on an hourly basis.

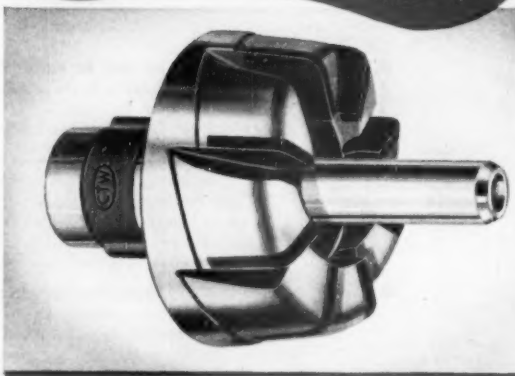
- **Gray-market boys are offering radio and television component parts** to manufacturers at retail prices, which are two-to-three times the normal cost. One midwest company recently purchased 5000 tubes on this basis.



Need Special CUTTING TOOLS?

Continental special cutter with carbide tipped inserted blades has a roller pilot which guides the tool as it finishes four concentric diameters and four shoulders. The drawing shows the cuts in heavy lines





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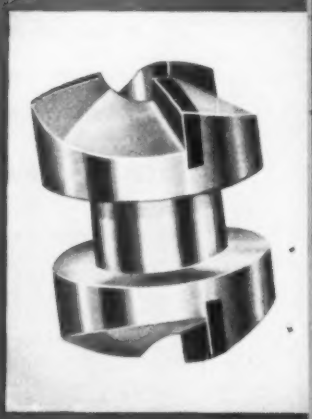
DESIGNS THEM TO SUIT YOUR NEEDS EXACTLY

Those high production jobs that have to show a profit are everyday problems at Continental. The Continental Cutting Tool Division of Ex-Cell-O designs and manufactures all the special cutting tools that are used in the Ex-Cell-O Organization. Continental Tools of all types are used day after day on gruelling production work that must pass rigid inspection and must be done at a profit.

Whether the job calls for high-speed steel, cast alloys or carbides, Continental can supply the tools to suit the job *exactly*. The new Continental Tool Catalog shows hundreds of cutting tools, standard and special, and broaches. If you haven't received a copy write for one today on your company letterhead. And for special tools just send a tool print or a part print showing operations to be performed and ask for a quotation.

This special Continental tool rapid rooms, forms a radius and hollow mills. Operations are illustrated in heavy lines in the drawing.



Continental double-end carbide tipped spherical grinding arbor used in a special machine for finishing two inside surfaces of automotive differential cases.

50-19

CONTINENTAL TOOL WORKS

Division of Ex-Cell-O Corporation

DETROIT 32, MICHIGAN

CTW

Washington

Rapid rise in prices of items the military buys has the Administration worried. Behind-the-scenes estimates are that the buying power of the defense dollar has been cut 30% in the last three months.

Competitive bidding by the armed services for the same production (Air Force and Navy both buy radar) is one reason.

But, manufacturers' price hikes seem to be the main cause for today's skyrocketing costs. Civilian producers of brand-name products are bidding high on defense contracts in hopes their competitors will get the business.

The result: prices for some things have increased over 200% in the last three months. Some examples of percentage increases in prices: medicine cabinets, 13%; wire-wound resistors, 25%; precision resistors, 20%; radiak training sets, 227%; copper, 15%; aluminum, 3%; corrosion-resistant steel, 3%.

The only real answer seems to be complete wage and price controls, along with materials allocations. Washington planners don't see how you can control prices of military supplies without controlling other prices as well.

Other methods will be tried first. Production allocation of certain plants to each of the three services will put an end to competitive bidding between Army, Navy, and Air Force.

Strict rationing of materials for civilian production will give manufacturers of civilian goods who accept defense contracts a guarantee that their competitors will have to cut back production too.

• • •

The "cost"—as well as the "price"—of waging war is going up too. Today's modern weapons are taking more skilled manhours, more scarce materials to produce.

A modern jet fighter is a $1-million investment. World War II's fighters cost $250,000. Army's new tank to replace the $200,000 General Patton is going to cost $300,000. The fully automatic, radar controlled 75mm skysweeper anti-aircraft gun costs $300,000—replaces a $60,000 model.

• • •

Think twice before accepting a government contract if your industry is one which hasn't had its minimum wages set by Labor Secretary Tobin under Walsh-Healey Act provisions.

Many successful low bidders—planning on low profit margins—are finding themselves in trouble as a result of recent hikes in minimum wage rates for work done on government contracts. Secretary Tobin's rulings apply to contracts now in force as well as future contracts.

Under the Defense Production Act of 1950 President Truman can:

Force producers to accept defense contracts ahead of all other business.

Control and requisition materials, including inventories.

Ration consumer goods.

Guarantee private loans, and make direct government loans to expand output.

Try out voluntary wage and price control. Order compulsory controls. Wage and price ceilings must be imposed simultaneously.

• • •

Under the act the President cannot:

Set wages and prices below the May 24-June 24 level with exceptions in cases where that period was abnormal.

Set farm price ceilings below parity or the highest based period price.

Set ceilings on margin requirements on commodity exchanges; professional service rates and fees; prices and rentals of real property; public utility and common carrier rates; insurance rates; prices of newspapers, books, motion pictures, other communications.

Order the settlement of labor disputes unless it is first agreed to by management, labor and the public at a conference called by the President.

• • •

It is too early for another War Labor Board. That is the advice President Truman is getting from those who ran the last one. Reason: Problem this time is inflation, not labor disputes. Besides, you couldn't get a no-strike pledge from Phil Murray or John L. Lewis before next spring, if then.

• • •

You're going to find military contracting officers driving a harder bargain. Munitions Board has issued a directive to the three services that strives for lower prices now, rather than waiting for recapture under contract renegotiation provisions.

• • •

Increased factory hiring was responsible for a new employment record of 62,367,000 set in August. Nonfarm jobs hit a record high of 54,207,000.

Unemployment, meanwhile, dropped more than 700,000 to 2,500,000, lowest since late 1948.

Even so, Secretary Tobin's view is that the country does not face an overall labor shortage, and that compulsory manpower controls are not needed, yet.

Shortages exist in some critical skills, particularly engineers, tool and die makers and all kinds of metalworking. Some voluntary steps are being planned to alleviate this situation.

$25,000

Saved on inspection in 24 months

This Sheffield machine gages and segregates refrigerator valve plates into 28 classifications—2,000 parts an hour. It has already paid for itself and is now saving a little more than $1,000 a month over the previous hand gaging method

The job is exacting because these valve plates have a highly lapped finish. They can be completely ruined by even the slightest scratch, and that happened frequently when they were gaged by hand.

The parts are loaded into the machine and a button pressed. The machine sorts and stacks them in individual chutes according to size, without marring their finish.

If you inspect mass-produced parts, why not look into the possibilities of Sheffield gaging and segregating machines. You will gain the benefit of Sheffield's many years of experience in this field. *Write for engineering data.*

5480

the *Sheffield* corporation

Dayton 1, Ohio, U. S. A.

GAGES • MEASURING INSTRUMENTS • MACHINE TOOLS • CONTRACT SERVICES • THREADING TOOLS

Detroit

If your wages haven't gone up already, and if you have any tie-up with Detroit, prepare for pressure soon. The CIO United Auto Workers, which sets patterns for labor behavior generally, is on the rampage for more money. Its demand: About 10c. Its justification: General Motors raised pay a nickel under its cost-of-living escalator clause; Chrysler came across with a voluntary dime; Ford was wildcat strike-pressured into eight cents; the rest of the auto industry is following suit.

Prepare, too, for some employment unsettlement among skilled men. The trend—begun in Detroit—is nationwide among so-called "captive" shops to increase rates in all skilled classifications by five cents or so. That narrows traditional differentials between captive and job shops. The captive shops apparently had to narrow the differential to hold onto help in the face of sustained job shop working opportunities today.

In any case, skilled men are hard to get. Buick used large display space in Detroit papers for several days running. Results were, at best, modest. Detroit companies which have been heavily patronizing the want ad columns report very disappointing results.

Manpower requirements in Detroit as of early September, as the State Unemployment Compensation Commission saw them, were short by 80 diemakers, 50 crane operators, 25 toolmakers, 25 arc welders, 20 machine molders, 20 milling machine operators, 20 electricians, 20 machinists.

Here's what's being done to overcome skilled help shortages: Overtime schedules; expansion of apprenticeship programs; recruitment of workers wherever possible through the country. In semi-skilled classes trained women are being recruited, so males can be upgraded.

• • •

Cadillac's tank job is in the nine-figure class. Ordnance reports place the size of the contract at $110 million, providing for delivery of 1000 light tanks. This doesn't mean that each tank costs $110,000 today—that money also provides for tooling.

• • •

You can write this down for sure, however: There will be plenty, plenty of tooling requirements. There are well-grounded reports that the search for tools in government storehouses is all but futile. Little is left beyond the highly tooled special machines which are practically useless on new types of production today. To tool for tanks at Cadillac-Cleveland will take new equipment on much more than half the factory floor.

The transmission for this tank will come from Allison. That GM division has leased a vacant plant in Indianapolis owned by Chrysler to build the job. Machinery ordering has begun, with the aim of starting parts production by the end of the year. The job is similar to that being made already by Allison for the Patton M-46 tank—a hydraulically controlled torque converter type.

At Detroit GM bought the one-time Stinson plant near Wayne, so its Detroit Diesel Engine Div. would have space to make auxiliary generators for the tank job. Tooling will begin shortly; output will begin in February with 400 men.

• • •

Detroit Ordnance also released a $30-million job to American Car & Foundry Co., Berwick, Pa., for howitzer carriages. Add to the arms list: A $400,000 award from the Bureau of Ships to Packard, for a prototype 600-hp 12-cylinder diesel engine.

The arsenal operated by Ordnance at Detroit is getting busier on its own. It will add 1000 workers in coming weeks to build medium and light tanks; about 6500 are now on payroll. The indication: Sustained tooling requirements, particularly in view of the new designs being developed there.

• • •

DeSoto is spending several million dollars on new plant facilities in Dearborn. 5000 employees will be divided between body and engine building.

• • •

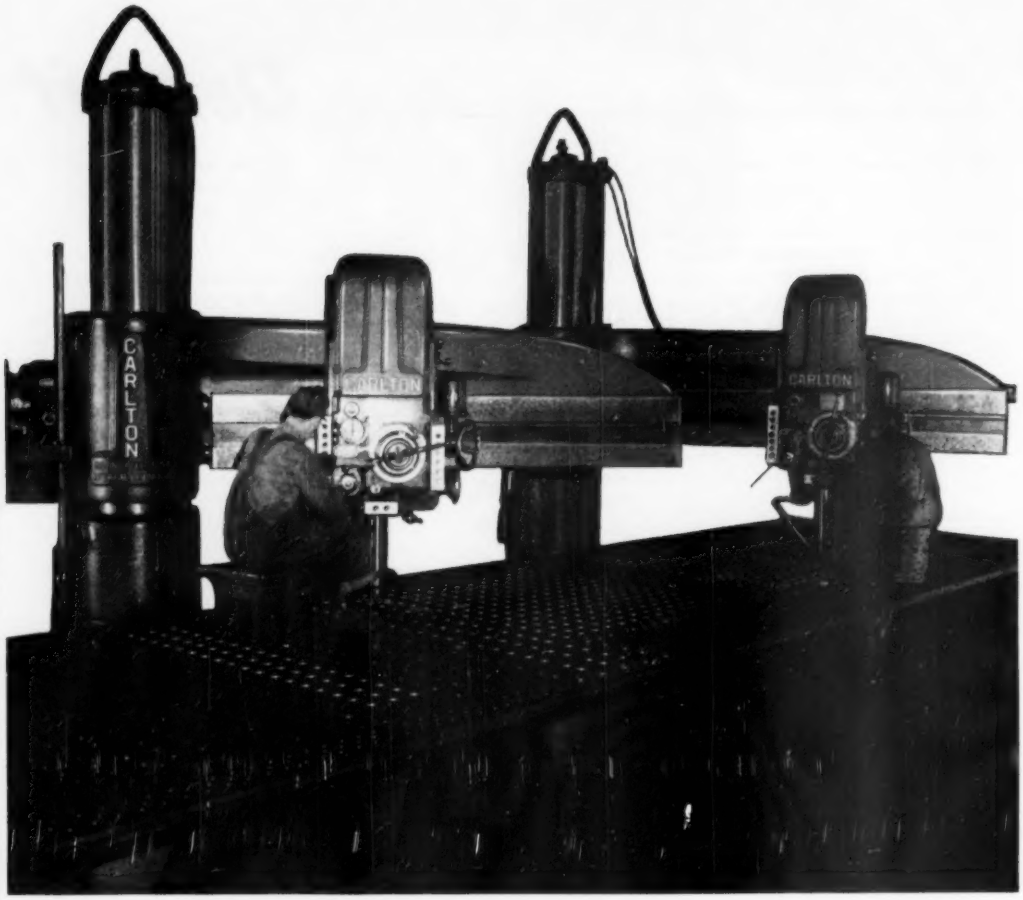
Other tooling opportunities: (1) A new Ford plant at Kansas City, to have capacity of 700 cars a day, to employ about 3000, probably to replace the present Ford assembly branch at K.C. (2) The newly purchased plant of Kelsey-Hayes Wheel Co. at Jackson, Mich., this being the former Thorrez & Maes Manufacturing Co. factory. Overflow war work from the present Jackson plant of K-H will be handled in the new facility.

• • •

Automobile business keeps on being super-colossal. In August GM built 364,942 cars second highest total for any month in its history. Its various divisions—and most other companies, too—announced all-time sales records so often that the words would have been monotonous if they hadn't been so spectacular.

• • •

Ford car and truck output in the first eight months of this year surpassed production for the entire year of 1949. A total of 1,327,843 cars and trucks were built, against 1,322,254 last year.



for **LARGE-AREA** *drilling and boring . . .*

rely on CARLTON RADIALS

IT'S a cinch that when drilling and boring extends over a big area, Carltons do the job better. Use them in tandem like the two Carlton 4-A radials shown above drilling and boring boiler plate or perhaps a single Carlton with track-type mounting would be better for your requirements. Either way, Carltons . . . with their easy, push-button operation and rugged construction . . are your best radial investment. Get the "hole" story, send today for descriptive bulletins.

THE CARLTON MACHINE TOOL CO.

CINCINNATI 25, OHIO

THE CARLTON MACHINE TOOL CO.

New Tooling

August surpassed July in machine tool orders by 25%, preliminary estimates reveal. July was more than double June. It stood at 253.3 on the index of the National Machine Tool Builders' Association. June was 124.1.

The smaller companies made the bigger gains during August. At the same time, many of the larger builders did as well or better in August as in July.

August's spectacular showing is partly accounted for by the fact that some companies put on their books many orders received the final week of July.

July and August have given a tremendous lift to the machine tool industry. September is not expected to hold up as well, but demand still is terrific compared with postwar standards which prevailed up to this summer.

• • •

Orders for machines for armament manufacture still are conspicuously small. Very few sales since the beginning of the Korean war are directly traceable to the defense program.

• • •

Machine tool production is expanding. August was somewhat higher than July. And September should bring a further rise. Many builders have added second shifts; almost all have lengthened the work-week.

Forty-five hours has become standard in many machine tool building shops, with others working 50 hours or even longer. Skilled help shortage is acute. Typical example is one company which would take on 100 more skilled workers at once if it could get them.

Cleveland builders are in the forefront of those turning to women to solve their labor problem. One company expects to do the same kind of training it did successfully during World War II. Many women applicants were wartime workers and need only a brief refresher course.

• • •

Escalator clauses are bobbing up again. Some builders are insisting upon them in orders for machines to be delivered later than six months from now.

• • •

A few ingenious customers, with contracts for defense items along with their normal products, are trying to speed deliveries of machine tools by claiming that they have high priorities from the armed services. Truth is that priorities do not exist.

• • •

August machine tool orders included number of complicated "specials" for automotive retooling requirements for 1952 models. They are for delivery next June or July. This business would have been placed regardless of the Korean war.

• • •

Machine tool capacity is being enlarged in one form or another. Monarch Machine Tool is constructing a plant addition. Warner & Swasey has more manufacturing space available at Cleveland by moving its Gradall Division.

• • •

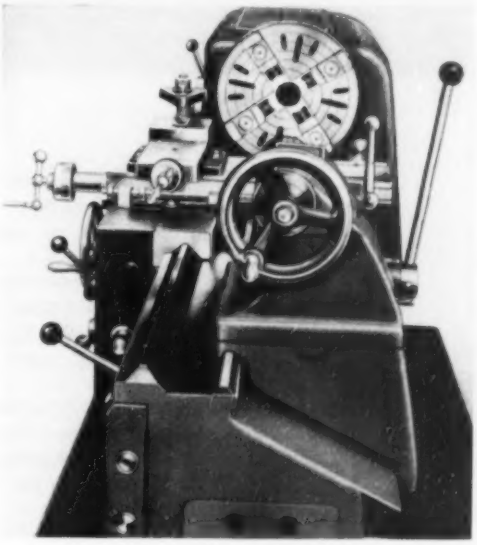
The huge tank program will require a large amount of new production equipment. Ordnance Corps of Army is searching government reserves before ordering new machines.

• • •

Thompson Products will spend $4 million on new machines for its aircraft parts production. The money comes from 1949 earnings.

• • •

National Screw Machine Products Association has located 220 multiple-spindle automatics 2-5/8 in. and larger among its members at request of Washington. Owners now have 6-9 months of work for these machines, whereas year ago they were hungry for business.



SLANTING BED on this German lathe allows chips to slide to the rear. Produced by Eugen Weisser, the gearbox is separated from the bed, with the latter being mounted on a cabinet foot. For the cutting of fine threads the feed gear is separated from the spindle gear and then belt driven. Trip-release mechanism in apron permits limit stops to 0.00039 accuracy

Announcing!

. . . . . HYDRAULIC OPENSIDE SHAPERS IN

STROKE LENGTHS NOW AVAILABLE
36″, 48″, 60″ AND 72″

WORK CAPACITY UP TO
24″ HIGH — 30″ WIDE

0-110 F.P.M. CUTTING SPEEDS
0-150 F.P.M. RETURN SPEEDS
HIGHER SPEEDS AVAILABLE

AUXILIARIES:
SIDE HEADS VISES
AUTOMATIC TOOL LIFTERS

HYDRAULIC DRIVE AND FEEDS
FOR FINE FINISH AND FAST
DEPENDABLE PRODUCTION

Hidden costs show themselves only on the balance sheet. A little extra output per machine — slight variations in quality — convenience in processing — these make the difference between a profitable and an uneconomical operation.

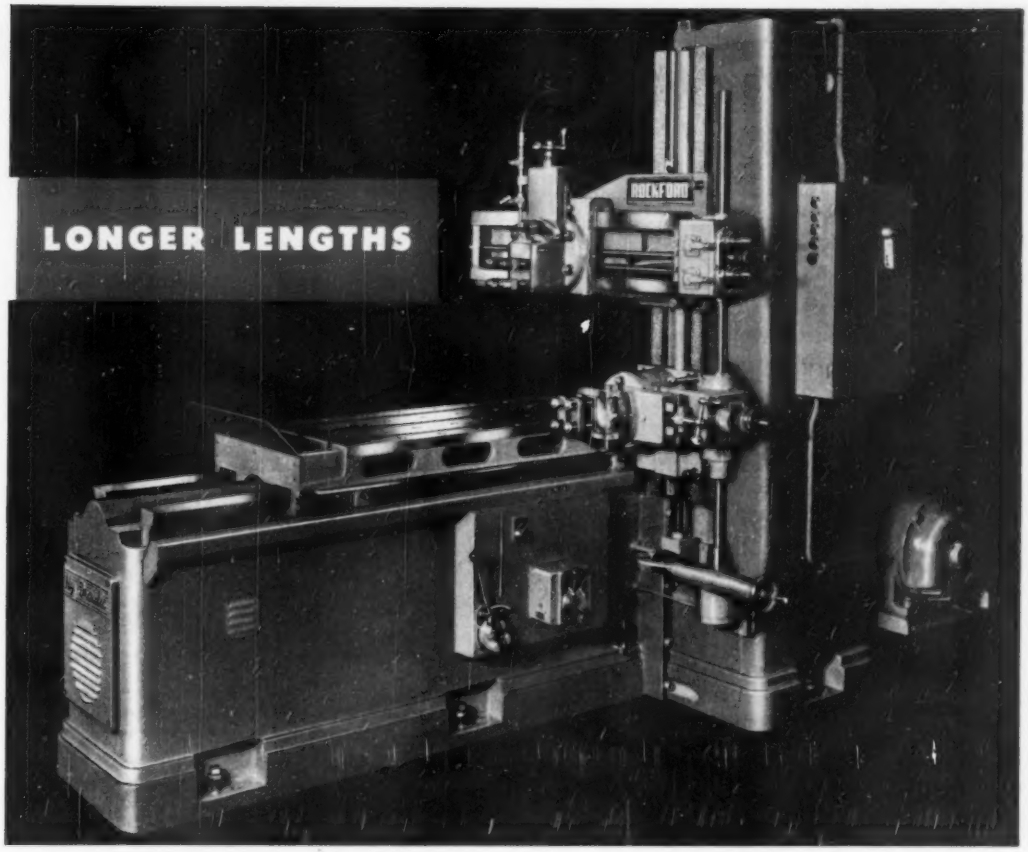
Greatest economy and efficiency result when jobs fit machines. True, many "fringe capacity" pieces are machined satisfactorily either with more machine than needed — or by stretching machines to do the job. But this increases unit costs, hampers output, set-up, handling and quality. It can frequently result in competitive disadvantage.

Check your present *small planing* and *large shaping* operations. These may seem to be satisfactory operations now. But are they economical and efficient when compared with the speed, convenience and capacity of *combining* this *range* of work on a single openside machine? Do results justify the time and set-up necessary?

Hy-Draulic
Reg. U.S. Pat. Off.

ROCKFORD MACHINE TOOL CO.

510



Rockford Openside Shapers adapt a greater range of work in this class, to make it right for the machine. This means the most efficient use of power, feeds and speeds, stroke lengths and size capacity in relation to output and accuracy required. Openside construction allows flexibility to suit size variations. Reciprocation of the work instead of the tool provides planer accuracy; eliminates overhang and reduces wear. Stroke lengths, feed and cutting speeds are adjustable within the range of the machine.

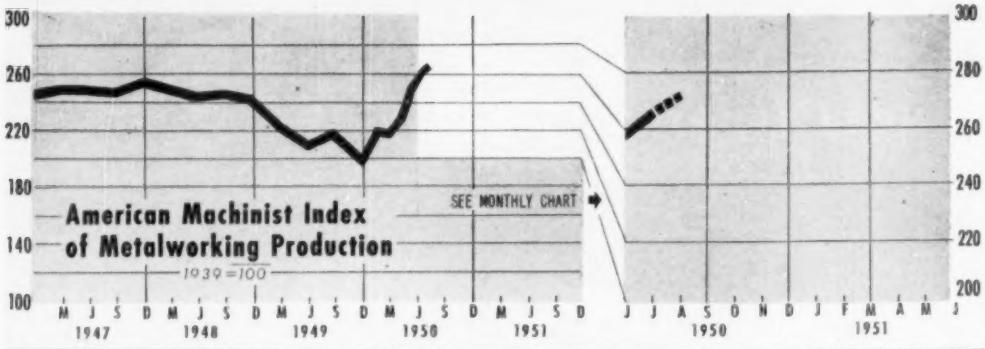
Ask a Rockford representative to show you the advantages of machining large shaper, small planer work on a single Openside Shaper. Present methods will prove inefficient. They can profitably be displaced with Rockford Hydraulic Openside Shapers.

Additional Data

and Specifications are shown in this Condensed Catalog. Send for a copy to use in comparing your present equipment.

2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

Gaging Metalworking



Metalworking Points Toward Busy Fall Period

Metalworking is heading into a booming fall season. Operations will zoom to a level not attained since World War II days.

September should top August in manhours worked. And August is estimated at 270 on the AMERICAN MACHINIST Index of Metalworking Production, with 1939 taken as 100. Shortage of materials will keep activities from going much higher.

• • •

Tightened credit restrictions imposed on automobiles and appliances, effective Sept. 18, will not have any immediate influence on production schedules.

With steel and other materials in short supply, manufacturers of consumer goods should be able to sell all their output with ease. Situation today is not similar to conditions two years ago, when Regulation W was clamped on. There was no immediate war threat then.

All steel mills are at full capacity, yet supply of many items is progressively getting worse. One steel company has heaviest backlog in history; another will not take further orders until it can bring back its order book to a sensible status.

Amount of overpriced steel available is small, hence little relief comes from that quarter. Several important sheet users say that they are paying premiums on about one-fourth the tonnage they get. Revamping of one big Bethlehem sheet mill is causing hardship among some customers, who will not get relief until this mill is back in production in November.

War demands will expand need for alloy steels, lengthening delivery time and reducing number of electric furnaces which can be used for manufacture of conversion carbon steel ingots.

EMPLOYMENT AND HOURS WORKED CONTINUE TO RISE TOWARD NEW HIGH

	Non Agricultural Employment (Millions)	Hours Worked in Manufacturing
1949		
Jan.	43.4	39.5
Feb.	43.1	39.4
Mar.	42.9	39.1
Apr.	43.0	38.4
May	42.7	38.6
June	42.8	38.8
July	42.6	38.8
Aug.	43.0	39.1
Sept.	43.5	39.6
Oct.	42.6	39.7
Nov.	42.8	39.1
Dec.	43.7	39.8
1950		
Jan.	42.1	39.7
Feb.	41.7	39.7
Mar.	42.3	39.7
Apr.	42.9	39.7
May	43.3	40.0
June	44.0	40.4
July	44.0	40.4
Aug. (est.)	44.1	40.5

INDEX

	AUG. '50	JULY '50(p)	JUNE '50(r)	JULY '49
	270*	264	258	220
Machinery		244	234	203
Electrical Manufacturing		303	289	228
Automobiles, Trucks		260	260	209
Transportation Equipment		249	225	260
Other Metalworking		285	273	233

AMERICAN MACHINIST'S INDEX OF METALWORKING PRODUCTION is based on manhours worked in the five components above.

*Estimated (p) Preliminary (r) Revised

Copper is even tighter than steel. Stocks are at a minimum; and there is no possibility of a gain in output the remainder of the year. Aluminum and nickel are in same category as copper, with voluntary allocations the rule.

• • •

Metalworking companies are bidding furiously for skilled help, combing communities far distant from home to secure more workers.

Service-industries workers (restaurants, laundries, retail stores) are transferring in growing numbers to defense plants or to companies destined to get war orders. Reasons: higher wage rates and relative security of war jobs.

• • •

Sales of farm equipment are booming, but production has been cut sharply by strike at International Harvester plants. Farmers remember how hard it was to get implements during last war. They also are buying in anticipation of higher prices later on.

• • •

Industry's $17 billion military production job breaks down as follows: aviation, $8.1 billion as a starter; guided missiles and guns, $2.5 billion; combat and non-combat vehicles, $1.6 billion; ships $400 million; electronics, $1 billion in prime contracts; soft goods (clothing, food), $3 billion.

Figures just listed do not include deliveries still to be made on old contracts. Subcontracts for electronics units from aviation and ordnance will be twice size of prime contracts.

• • •

Gray iron foundries are at 80% of capacity, whereas 65% is considered normal. Most of recent gains appear to be from customers wanting to stock up. Otherwise, flurry of activity sparked by Korean war has had little effect. War orders are almost non-existent.

• • •

Steel casting industry is running at 85%. Increase has been gradual over last seven months. Railroad car building program has given the steel founders a terrific shot in the arm.

Malleable iron foundries report a labor shortage as operations soared to 80% of capacity. No raw materials problems have cropped out, but pig iron is being closely watched.

• • •

Steel stamping shops are mostly on a two-shift basis on peacetime products. About half the country's commercial stampers could use more steel if they could get it. These companies will not get actively into war work until their customers know what they are to do.

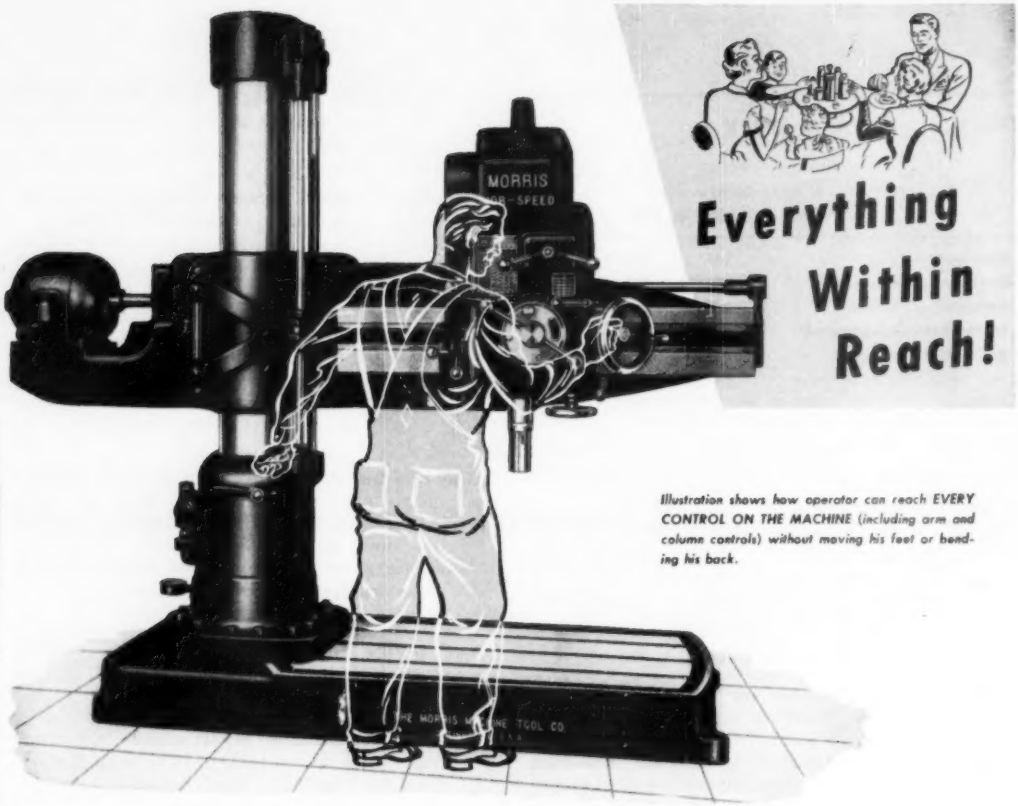
WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week index of activity (1923-1925 = 100)*	219.2	216.8	185.1
Steel ingot operations (% of capacity)	98.0	97.1	84.2
Electric power output (million kilowatt-hours)	6,459	6,346	5,544
Production of automobiles and trucks	188,264	179,042	146,039
Engineering construction awards. (Eng. News-Record; millions)	$256.1	$352.5	$146.5

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Refrigerators, domestic sales (thousands of units)	491	534	315
Vacuum cleaners sales (thousands of units)	280	250	162
Washers sales (thousands of units)	282	325	201
Household electric ranges (thousands of units)	131	159	62
Television receivers production (thousands of units)	330	389	80
Radio receivers A.M. and A.M.-F.M., production (thousands of units)	723	1,054	342
Gear sales index (1935-1939 = 100)	410.7	401.1	193.1
Foundry equipment new orders index (shipments 1937-39 = 100)	401.8	622.7	146.6

*Seasonally adjusted.



Everything Within Reach!

Illustration shows how operator can reach ***EVERY CONTROL ON THE MACHINE*** *(including arm and column controls) without moving his feet or bending his back.*

Designed to set a cost-killing pace in the race for profitable production, the MORRIS MOR-SPEED Radial Drill offers a long series of outstanding features:

- **Centralized controls—reduces time between cuts.**
- **Variety of Speeds and Feeds—better selection of the right combination for job at hand.**
- **Automatic Lubrication—prevents damage and saves wear.**
- **Greater strength, rigidity and balance—provides greater machining precision.**
- **More automatic stops—saves time and reduces manual control.**

If you are interested in removing metal faster, with greater precision and at less cost, investigate MORRIS "MOR-SPEED" Radial Drills.

Write for copy of new Bulletin 239-A.

THE MORRIS MACHINE TOOL COMPANY

"A better product at less cost— with MORRIS ENGINEERED PRODUCTION"

Builders of MOR-SPEED Line

933 HARRIET STREET CINCINNATI 3, OHIO

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Time to End a Vicious Practice

We heard the story recently of the machine operator who insisted on working at his own pace, which was much faster than the standard set by the union.

"The boys" told him to lower his production. But he paid no attention to them. Finally, he was informed that for the sake of his health, it would be a good idea for him to take it a little easy.

He saw the point. And he used his own peculiar method of living up to the union's demand. He continued to work at the same pace as previously and was able to turn out in six hours the day's maximum stipulated by the union.

At that juncture he stopped his machine, washed up, and for the remainder of the shift sat beside his machine reading or doing nothing.

THIS INCIDENT seems a bit silly and amusing. But viewed seriously as it should be, it indicates the length to which unions sometimes will go to cancel the benefits of mechanization.

The unions have been motivated for years by a great fear—that machines will put men out of work. The specter of 1932 still haunts them.

There is nothing ahead to give substance to such fears. There has been a market for almost everything produced since the end of the war. All the studies made of the decade ahead, and even beyond 1960, predict an expanding economy.

And remember that those studies do not take into account the manpower required by the Korean war or by any preparedness or mobilization program beyond that.

IT IS CLEAR that there will be plenty of work for everybody to do in the 1950's; and some of it may not be of the most pleasant kind. The problem will be to find enough workers, not to find enough jobs.

Our chief hope of continuing to have both butter and guns is for productivity per manhour to rise. That means putting a stop to the kind of nonsense described at the beginning of this editorial.

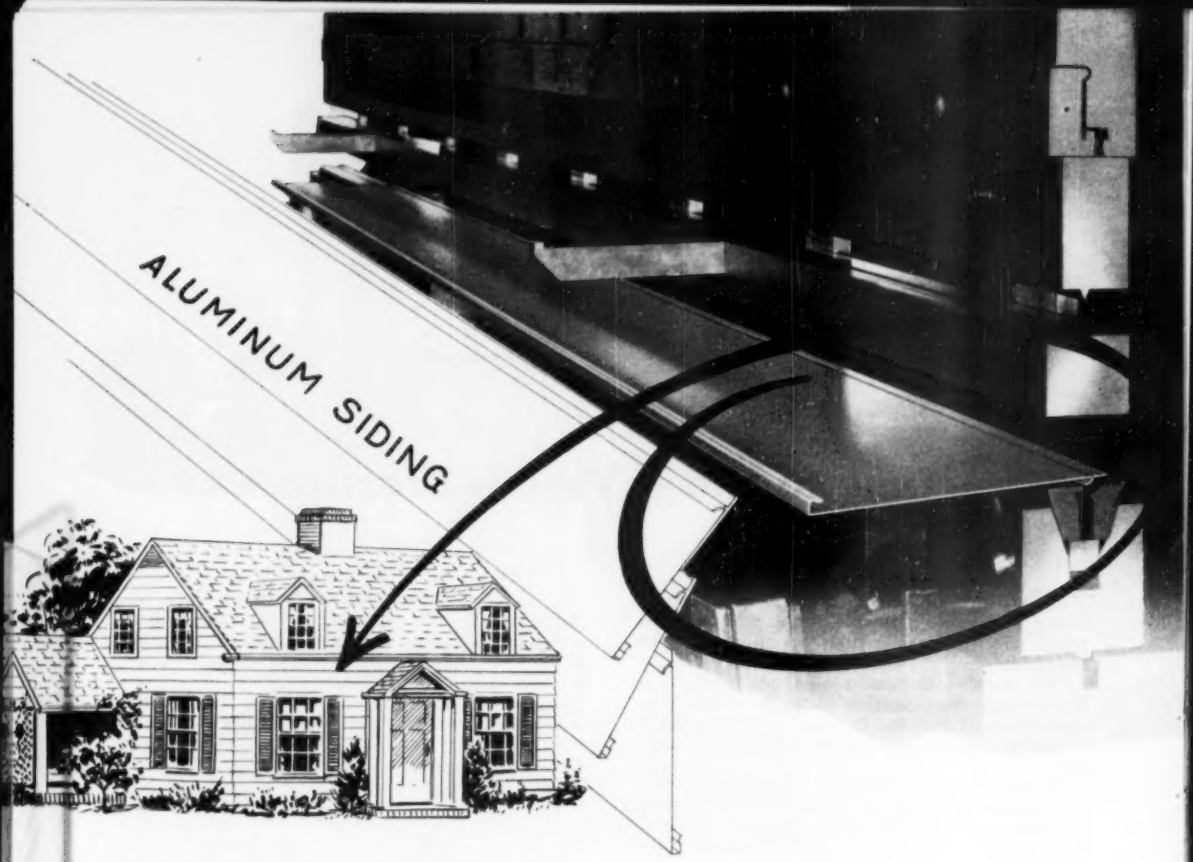
The days ahead will be no time for boondoggling, for featherbedding, or for any vicious practice which artificially restricts production or which forces employment of two men to do one man's work.

We urge responsible union officials to lend their personal influence and the weight of their office to stamping out such practices. For the fact is that the only way in which we can continue to maintain a high standard of living is to get the full benefits of the machine through ever higher productivity.

SOME TOP-FLIGHT labor leaders like Walter Reuther already have recognized that truth. All unions should take as their model the language of the General Motors-United Automobile Workers five-year contract which reads:

"A continuing improvement in the standard of living of employees depends upon technological progress, better tools, methods, processes and equipment, and a cooperative attitude on the part of all parties in such progress. . . . To produce more with the same amount of human effort is a sound economic and social objective."

Burnham Finney



building industry uses

Cincinnati Press Brakes for multiple bends

Cincinnati Press Brakes are forming multiple bends in one hit on this aluminum siding—a high production item.

Economies—through speed, accuracy of performance and minimum handling—are giving low cost per piece.

Window and door frames, gutters, structural members and other items of the building industry are being produced on Cincinnati Press Brakes with parallel economies.

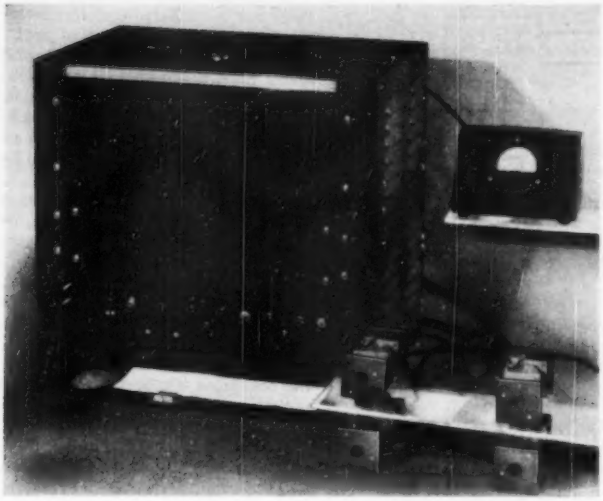
The unusual accuracy and great versatility of Cincinnati Press Brakes make them very profitable both for this production job and for jobbing work. Cincinnati Press Brakes produce a quality product at a low cost. They are a profitable investment.

Write for comprehensive, illustrated catalog—B-2-A—covering construction and many uses of Cincinnati All-Steel Press Brakes.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

SHAPERS · SHEARS · BRAKES



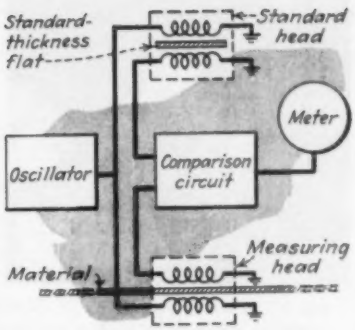


Fig. 1..Thickness of non-magnetic materials is determined by the relative secondary voltages induced in the two heads. An Industrial Electronics, Inc. instrument is pictured without mounting fixtures and rollers, and with a sheet of glass between the two heads

Electronic Gages Solve Various Problems

Measuring speed and accuracy on close-limit tolerances are inherent in electronic gages . . . But there are other uses too: gaging of work that moves continuously, checking coating thickness, measuring wall thickness when only one side of the work is accessible . . . Simplified circuit diagrams show possibilities; promote an understanding of these instruments

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MANY gaging problems cannot be solved satisfactorily except by electronic methods. It is difficult or impossible to use conventional mechanical and optical gages for:

1. Measurement of thickness at center of large flat sheets.
2. Checking dimensions and thickness of pieces which can be reached from only one wall.
3. Gaging of hot or rapidly moving objects to which direct contact cannot be made.
4. Measurement of strain under load and of rapid vibrations. Many other difficult measurements will readily suggest themselves.

There are also many types of measurements (usually in production of large quantities) where an electronic gaging system may be set up to simplify the test operation. The inspector obtains a good-bad reading directly from the instrument and need not exercise much judgment.

Most electronic gages come under the categories of thickness gages and micrometers. Their proper application can simplify many types of measurements, and make them of considerable value in manufacturing.

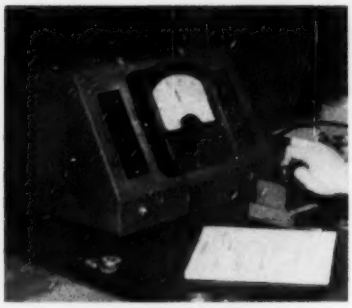
Electronic Thickness Gages

Three types of electronic thickness gages have been developed: Those which measure by means of electromagnetic fields; those which use ultrasonic vibrations; and those which measure the absorption of various types of radiations.

Electromagnetic Types—The electromagnetic thickness gage uses two members which remain in direct contact with the two sides of the piece. Their separation measures the thickness. This separation is measured by their direct electromagnetic interaction rather than by the mechanical methods of conventional thickness gages.

NON-MAGNETIC MATERIALS. In the electromagnetic thickness gage, Fig. 1, two measurement heads are used —one for a standard specimen and the other for the work. Each of these heads consists of primary and secondary windings separated by the thickness of the material being measured. The relative voltage induced from the primary to the secondary winding depends entirely upon the separation between the two windings, and therefore upon the thickness of the material separating them.

The two transformers of this gage obtain primary voltage from the same oscillator. They are balanced



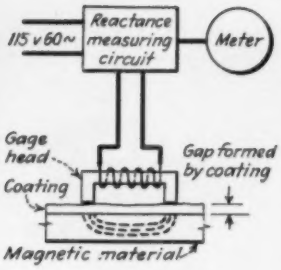


Fig. 2..Thickness of coatings on magnetic materials is measured by the change in reactance, which is proportional to the gap occupied by the coating. Copper plating on electronic-tube parts is measured with a General Electric thickness gage

so that the same voltage is induced in the two secondaries when samples of the same thickness are placed in the two heads. A standard-thickness flat is left in the standard head and the work material is passed through the measuring head. The two secondary voltages are now compared by the circuit, the meter being calibrated to compare thickness of the measured material with the required thickness.

Range of this gage is approximately 0.001 in. to more than 1 in., and it is sufficiently sensitive to give full-scale meter readings for variations as little as ±0.0005 in. from the mean thickness.

MAGNETIC MATERIAL. In a gage like that in Fig. 2, the work material forms part of the magnetic gap of an iron-core inductance. The inductance changes in proportion to permeability of the gap. Reactance of the coil is measured at 60 cycles by the circuit, and the meter shows the variation from standard.

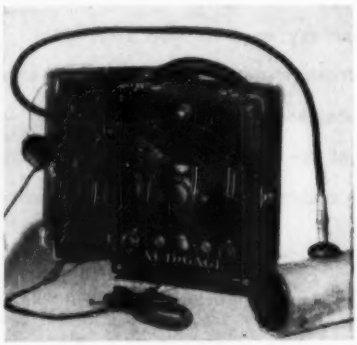
This type of gage can be used for a wide variety of thickness measurements. One application is to measure thickness of non-magnetic coatings on magnetic surfaces — films, paints, and metal platings. Since the coating introduces a non-magnetic gap into the magnetic path and the reactance is very sensitive to the thickness of the gap, accurate measurements are obtained. Sheets of non-magnetic materials such as mica, glass and plastic can be measured by placing the material on a table having a steel top of uniform thickness. Thickness of steel or iron sheets can also be measured with this gage. When the gage head is placed directly against the sheet, the permeability is proportional to the thickness, and the gage thus gives a relative thickness reading.

Gages of this type give reliable readings for coating thicknesses of 0.00001 in. Under carefully controlled conditions, one-millionth of an inch can be read. Steel-sheet thicknesses up to 45 mils can be measured, and insulating materials from 1/32 to 3/4 in. thick can be measured to about 1% of total thickness.

Ultrasonic Types—Ultrasonic vibrations can be widely used for determining internal structure of materials, for testing metals, glasses, and many plastics. In measuring thickness, the same principle is applied as in the organ pipe—when the thickness contains an integral number of half-wavelengths a resonance will be set up.

Basic ultrasonic thickness gages like the "Audigage" operate as shown in Fig. 3. The signal is generated by an oscillator connected to the measuring crystal. The crystal, when placed in contact with work surface, transmits vibration into the material. If the frequency is an integral number of half-wavelengths, the resonance is reflected back to the oscillator. Otherwise, no effect will be produced.

Material thickness can therefore be measured by tuning the oscillator, and observing a resonance indicator. The lowest resonance is the frequency at which the thickness is one-half wavelength. Velocity of sound through a particular material is constant. Hence, from the wave-



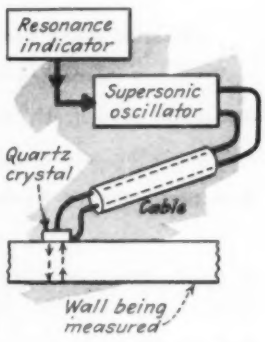
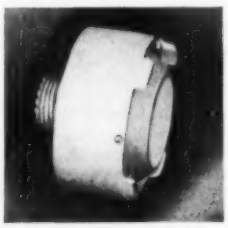


Fig. 3..Wall thickness of tubes, vessels and tanks is measured by supersonic instruments, like the "Audigage", in which supersonic vibrations are tuned until resonance is obtained. The lowest corresponding half-wavelength is an accurate indication of the thickness



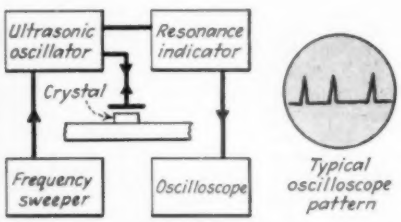


Fig. 4..Gaging the thickness of non-moving work can also be done with a crystal pickup, as in the "Reflectogage", the resonant frequencies being indicated as peaks on an oscilloscope screen. Crystal pickup is shown at left

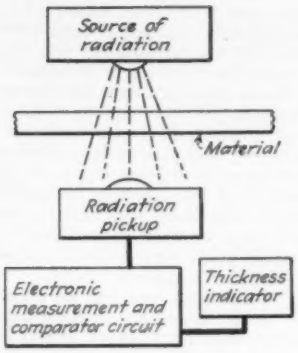


Fig. 5. Radiation transmitted through a workpiece is a function of material and thickness. This circuit can be adapted to simple thickness measurement or to control of the sheet producing machinery

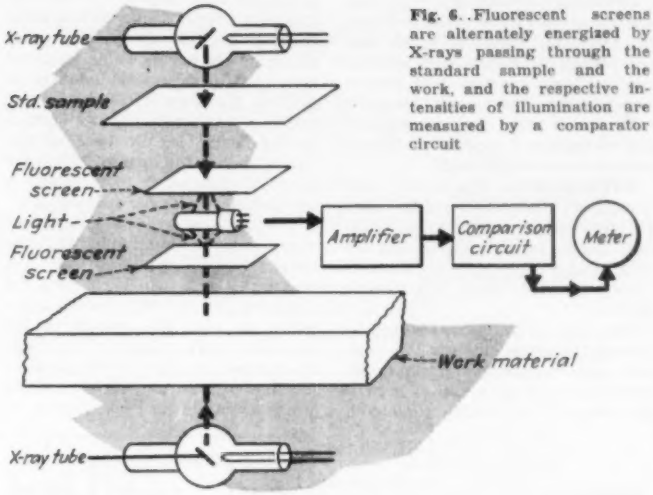


Fig. 6. Fluorescent screens are alternately energized by X-rays passing through the standard sample and the work, and the respective intensities of illumination are measured by a comparator circuit

length, a thickness calibration may be obtained for each material.

This type of gage is useful in measuring thickness of pipes, tanks, vessels and other structures which are accessible from only one side of the wall. Steel in thicknesses from 0.125 to 12 in. can be measured to an accuracy of better than 1% for materials of uniform thickness, and from 2 to 5% when measuring corroded materials. Because of the necessity for tuning the oscillator, the gage can be used only for single readings and not for continuous gaging.

The ultrasonic thickness gage can be made simpler to operate by use of an automatic frequency-adjusting circuit and an oscilloscope as in the "Reflectogage," Fig. 4. Output of an ultrasonic oscillator is applied to a crystal, which transmits the vibration into the material, as in the Audigage. But, here, the oscillator frequency is swept through its entire range automatically, and the resonance is indicated on the screen of an oscilloscope.

Resonant frequencies are indicated as peaks on the screen, and are calibrated for the different materials. This unit instantly measures thicknesses from 0.025 to 0.300 in. thick. It cannot be used conveniently for continuous gaging of moving material because the crystal must be supported at a fixed pressure against the work.

Penetration Types — Gages have been developed, partly as a result of atomic research, to indicate thickness by measuring the absorption of atomic radiation through the material. Ratio of transmitted to incident intensity indicates the thickness of homogeneous materials. The particular type of radiation depends primarily upon the material, because of the absorption properties of different substances. These gages are useful in measuring thickness of materials to which direct contact or pressure cannot be made.

As shown in Fig. 5, radiation passes through the work material and the amount transmitted is measured by the radiation pickup used with an electronic amplifier and measurement circut. The gage is calibrated by measuring absorption by known thicknesses of the material; then the work thickness is directly indicated by a meter.

This principle has been utilized in a number of commercially available thickness gages. In a gage developed to measure thin films and sheets, the radiation consists of beta rays emitted from a small bit of Carbon 14 (a radioactive isotope of carbon). The radiation pickup is an ionization chamber, whose current is amplified by vacuum tubes to operate an electric meter calibrated in terms of thickness, according to ray intensity. With further amplification the film thickness can be controlled by regulating the process which produces the film. This gage accurately measures films as thin as 0.001 in.

X-rays are conveniently used to measure thickness of metal sheets and other materials. In a typical arrangement, Fig. 6, two X-ray tubes are used. One transmits through the sheet being gaged, while the other transmits through a standard thickness sample. The two beams strike alternately on two fluorescent screens. Resulting intensities of illumination are compared and measured by the comparator circuit, which indicates the difference in thickness upon a meter. This system can use a single X-ray beam, with the photo-tube indication being calibrated directly in terms of thickness.

In the Penetron, thickness is measured from one side of the material by means of gamma rays. As diagrammed in Fig. 7, radiation is directed at the material, and the back-scattered radiation on the same side is measured. A shield placed between source and pickup prevents direct radiation from affecting readings. Some of the incident gamma rays are back-scattered by electrons of the atoms through which they travel. Hence, intensity of back-scattered radiation increases as a direct function of the material thickness.

Back-scattered radiation depends upon density and type of material. Thus, a calibration is required for each material. These calibrations are furnished with the instrument, and are not affected by small changes in chemical composition. For example, the calibration curves for iron also apply to alloyed steels.

The radiation pickup in this gage is a Geiger counter whose pulses are electronically amplified and counted, and a proportional reading is indicated by a meter. Meter readings are readily converted to thickness of material by referring to the appropriate calibration curve. Thicknesses of steel up to about 0.75 in. can be measured to an accuracy of 3%.

Electronic Micrometers — Several electronic units have been developed for measuring distances which cannot readily be determined by conventional micrometers and dimensional gages. Instruments available make use of three basic principles—electromagnetic, optical-electronic, and mechanical-electronic.

Electromagnetic Types—An electromagnetic field can form the basis for micrometers as well as for thickness gages. In this application the field is used to measure the distance from a reference point to a metallic surface.

One unit, Fig. 8, makes use of mutual induction between two coils, and depends upon the fact that radiated energy from a coil is zero at the surface of a perfectly conducting metallic surface adjacent to the coil. The reason for this effect is that eddy currents are set up in the metal which create an opposing magnetic field that exactly cancels the incident field at the surface. If the second coil is moved away from the surface of the metal in the field of the radiating coil, the amount of energy which it picks up is proportional to the distance from the surface.

The complete micrometer unit consists of an oscillator which supplies energy to the radiating coil; the measuring head which contains the radiating and the pickup coil; and a meter to read the energy in the secondary coil, calibrated in terms of distance from a metal surface. The two coils are mounted in a single probe assembly for convenience.

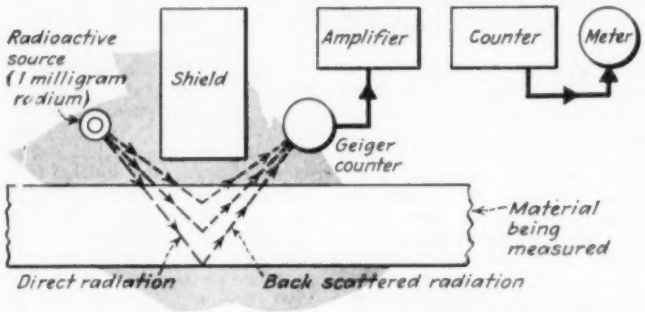


Fig. 7. When only one side of a hollow member is accessible, back-scattered gamma-rays are utilized by the "Penetron" to indicate thickness within an accuracy of 3%

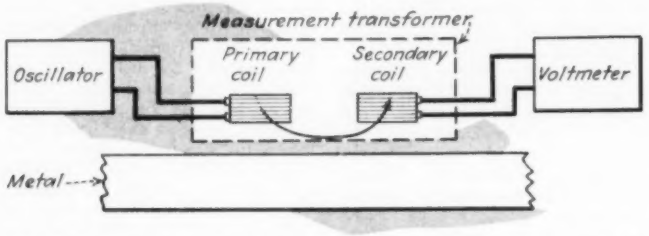


Fig. 8. If the secondary coil is moved relative to the primary coil, as by a stylus passing over the work surface, changes in thickness induce a change in field strength which is measured by the voltmeter

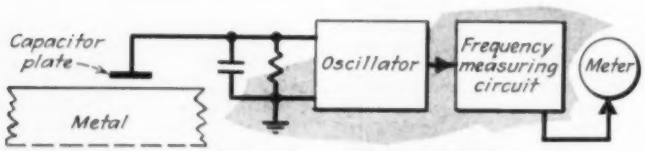


Fig. 9. Thickness changes of the work (metal) can be detected by a change in capacitance, which is a function of the distance between the work surface and the capacitor plate or micrometer

A second instrument, Fig. 9, the capacitive micrometer, makes use of the capacity between a fixed plate (part of the micrometer) and any metal object to measure the distance between the plate and the surface of the object. This capacity is made part of the tuned circuit which controls the frequency of an oscillator. Variations in capacity will result in changes in frequency of oscillation. A frequency-measuring circuit gives a voltage reading proportional to frequency, the meter being calibrated in terms of distance.

The inductive unit was developed by the U. S. Bureau of Standards, and is capable of measurements of distances of 0 to 0.05 in. with an accuracy of 0.00005 to 0.000 in. The capacitive micrometer is a commercial unit with full-scale ranges from 1 microinch to 0.01 in. and an accuracy of better than 1% on any range.

The electromagnetic micrometer is of greatest value when accurate measurements of small distances are necessary without direct contact with the object. Such measurements are of value when it is desired to measure rapidly moving objects, or to measure and record the variations in dimension of a single object over a period of time. Important applications are: measurement of eccentricity of rotating shafts and thermal expansions of metals.

To test scratch depths and surface smoothness, the capacitor plate is mounted on a fine sapphire stylus which is moved across the surface. Depth of penetration of the stylus is indicated by the distance between the plate and the surface. This type of micrometer can also be used as a thickness gage, and for dimensions of non-metallic objects, by means of special fixtures which cause the reference plate or coil to move by the distance to be measured. Generally these fixtures must be made especially for the particular application involved.

Optical-Electronic Types — Optical gaging methods result in considerable improvement in speed and accuracy of many inspection procedures. The basic method is to cast a shadow of the specimen on a standard mask of the correct dimension, so arranged that the amount of light falling on a photoelectric tube depends on the difference between the measured and the standard dimensions. The setup depends upon the nature of the object tested. It is, therefore, most useful in manufacturing operations where large quantities of the same object are being made, and where the object is of

a simple geometric shape which lends itself to the shadow technique.

Typical applications are: continuous measurement of wire diameter and strip thickness, and in production testing of piston rings.

The setup for measuring wire diameter or strip thickness is shown in Fig. 10. A projection lamp and lens are arranged so that parallel light beams cause the measured object to cast a shadow on the cathode of a photoelectric tube. Between the object and the tube is placed a mask. This mask contains a measuring aperture and two openings on either side. These openings represent the positive and negative tolerance limits of the product. The amount of light falling on the phototube depends upon which of the apertures is exposed by the shadow, and therefore upon the dimensions of the object. Output of the phototube can be amplified and indicated on a meter calibrated directly for mechanical dimensions.

In one such unit a scanning and interrupter disk rotates in front of the apertures so that they are exposed in sequence. This results in a rapidly changing voltage that is amplified and observed on the screen of an oscilloscope. By synchronizing the oscilloscope trace with rotation of the disk, three horizontal lines are obtained on the screen, representing the dimensional limits. If the size of the material changes, the amount of light on the phototube changes, and the line representing the particular aperture changes in position on the oscilloscope screen. Relative position of the test trace with respect to the two limit traces indicates the dimensions of the material. The measurement is proportional to the tolerance desired, and does not depend upon absolute dimensions of the object.

The gaging of piston rings is more complex, primarily because a more complex geometrical shape is involved and more than one measurement must be made. The dimensions inspected are trueness of periphery and width of gap. This is done by comparing the periphery of the ring under test with a master ring. The ring to be tested is placed inside the master ring. Then a power-driven mandrel rotates them both, with a beam of light scanning the space between them. A phototube picks up the light that passes between the piston ring and the master.

Whenever too much light falls on the phototube due to excessive clearance between the two rings, the control circuit lights up a red light.

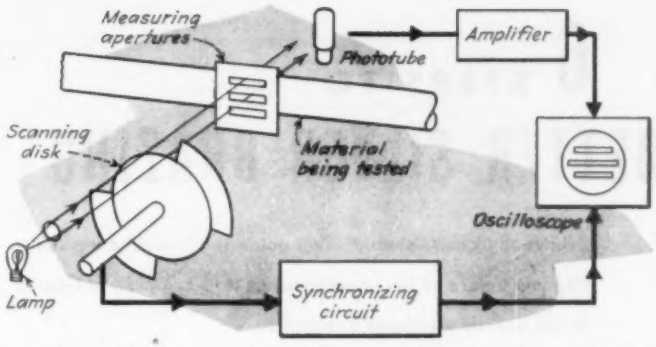


Fig. 10. . Wire diameter or strip thickness is rapidly checked in an optical-electronic gage by the position of the central test trace on the oscilloscope in relation to the traces for the upper and lower tolerance limits

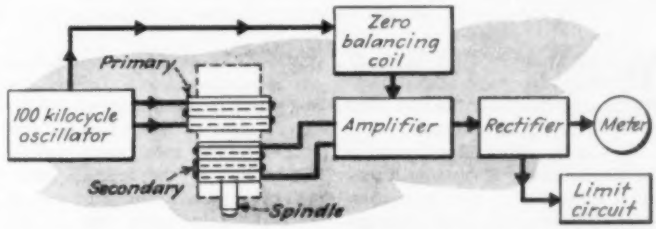


Fig. 11. . Displacement of the secondary coil (connected to a spindle as in a micrometer) with respect to the fixed coil (as in an anvil) induces a voltage. The meter can be calibrated to read very close tolerances, or signal lights can be arranged to show when workpieces are outside of set limits

Another phototube system scans the width of gap and indicates whether it is undersize or oversize, according to the amount of light on the phototube. This unit is capable of completely inspecting a piston ring in less than 5 sec.

Both units are commercial instruments designed for specific measurements. However, the same principles can be applied to many other manufacturing operations.

Electronic-Mechanical Types — In measurements where mechanical motions or displacements are the only practical method of determining desired dimensions, electronic circuits can be used to improve the accuracy and sensitivity, to simplify the measurement, and to make it more rapid for production applications. Essentially this is done by coupling an electromagnetic micrometer to some part of the mechanical gage.

In the comparator gage shown in Fig. 11, the mechanical measuring element is a spindle whose position is determined by the dimension being measured. Coupled to this spindle is a coil whose displacement from a fixed reference coil is measured by the electronic circuit. Voltage induced in the coil from the reference coil is fed into an amplifier. An additional out-of-phase voltage permits the zero to be set anywhere in the operating range by balancing out the gage-head voltage.

The basic principle is seen to be similar to that of the thickness gage of Fig. 1. Output of the amplifier is read on a meter calibrated directly in distance, in four ranges with zero-center readings from ±0.0001 to ±0.003 in. full-scale. Once the zero reading has been set for the correct dimension, the gage then reads variations from this value. It can thus be set to read accurately for very close tolerances regardless of how large the absolute dimension of the object may be. Output of the amplifier circuit is also applied to a limit-control circuit, in which the grid voltages of two amplifier tubes are adjusted to represent any desired tolerance. Hence, relays and lights may be operated whenever a reading is outside of the set limits.

Many other types of gages can be constructed by making use of electronic techniques in conjunction with one or more mechanical measuring units.

6 STEPS TO BETTER SILVER BRAZING

Everybody knows about "silver soldering"—but how much?

Are you aware of the importance of closely followed rules?

If not, here is profit and production

in a half dozen simple steps

BY ROGER METZLER, Sales Engineer, HANDY AND HARMAN, NEW YORK

WHAT is silver alloy brazing? When are these alloys used? Where and how can they be used to the greatest advantage?

Essentially, silver alloy brazing is the phenomenon of wetting a metallic surface with a molten silver alloy and obtaining a bond between the metal joined and the brazing ally. There are factors which affect the strength of such a joint but in the main the first requisite for a silver brazed joint is that the brazing alloy be capable of wetting the joint surface. Certain metals are incapable of being wetted by these brazing alloys principally because their melting point is very close to or below the flow point of the brazing alloy. In general, copper and copper alloys, nickel and nickel alloys and the ferrous metals including stainless steel, malleable, and cast iron are routine items for the brazing operator.

High - strength silver - alloy brazed joints depend upon these factors:

1. The degree to which the brazing alloy will wet and bond in the materials to be joined.
2. The thickness of the brazing alloy in the joint.
3. The strength of the metal or metals being joined.
4. The amount of voids or flux inclusions in the joint.
5. The mechanical characteristics of the joint design.

It will be noticed that the strength of the brazing alloy itself is not mentioned as a pertinent factor in a consideration of joint strength. This omission is intentional. Failure under stress, in the low strength materials such as some ferrous and copper alloys, with tensile values below that of the brazing alloy, will occur outside the joint area if it is properly made, and in the harder materials, the failure will occur in the joint at loads far in excess of the brazing alloy strength.

Most metals, except those previously noted, are readily wetted and bonded by the low-temperature silver brazing alloys, with a resultant joint strength greater than that of the brazing alloy. Certain materials require special attention for the attainment of maximum joint strength. Two such considerations are, special flux for aluminum bronze alloys and a brazing alloy containing a small percentage of nickel for brazing certain types of carbides. In both of these cases the variation concerns primarily the wetting of the material being joined.

Good Design Necessary

An important consideration with respect to the thickness of the brazing alloy in the joint is the economy to be achieved from good design. The joint thickness can have an appreciable effect on the cost of a brazing operation particularly

STANDARD LOW-TEMPERATURE ALLOYS

SILVER Percent	COPPER Percent	ZINC Percent	ADDITIVE Percent	MELTING Point °F.	FLOW Point °F
50	15½	16½	(18 Cd)	1160	1175
50	15½	15½	(16 Cd 3 Ni)	1195	1270
45	15	16	(24 Cd)	1125	1145
35	26	21	(18 Cd)	1125	1295
15	80	—	(5 P)	1185	1300
5	58	37		1575	1600
7	85	—	(8 Sn)	1225	1805
9	53	38		1450	1565
20	45	35		1430	1500
20	45	30	(5 Cd)	1140	1500
30	38	32		1370	1410
40	30	28	(2 Ni)	1240	1435
40	36	24		1330	1445
45	30	25		1250	1370
50	34	16		1275	1425
60	25	15		1260	1325
60	30	—	(10 Sn)	1095	1325
65	28	—	(5 Mn 2 Ni)	1385	1445
65	20	15		1280	1325
70	20	10		1335	1390
72	28	—		1435	1435
75	22	3		1365	1450
75	20	5		1350	1425
75	—	25		1300	1345
80	16	4		1360	1490

when the joint area is large. While this is important it is secondary to the effect of joint thickness on the strength of the joint.

From these preceding data, it is quite apparent that no broad statement or empirical formula could be developed to define or establish the strength of a silver-alloy brazed joint. For purposes of placing a limit, however, it has been established that under proper metallurgical and mechancial conditions it is possible to obtain a silver-alloy brazed joint with tensile strengths up to 130,000 psi and shear strengths to 48,000 psi.

Before developing the physical factors which form a part of good brazing procedure, let us consider some of the known extremes of mechanical working to which silver-alloy brazed joints have been subjected. Copper and brass rods, butt brazed have been drawn to fine wire and plates have been clad with other metals by brazing and rolled into thin sheets. Motorcycle frames fabricated by the silver alloy brazing of the tubular member have been used by daredevil exhibitionists in flying leaps over automobiles and similar obstacles.

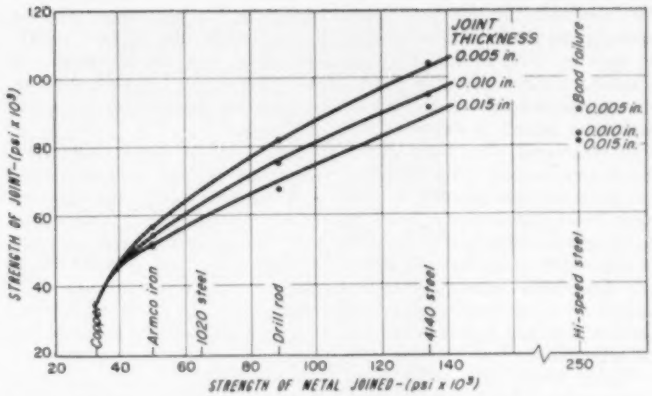
Six Definite Steps

However, these results are not obtainable without some preparation, some definite procedure, or some effort on the part of the brazer. For simplification and a clear-cut approach to the use of silver brazing alloys the proper brazing method has been set down as the following Fundamentals of Silver Alloy Brazing:

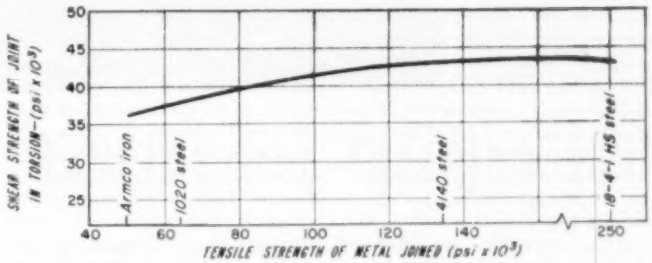
1. Good fit and proper clearance
2. Clean metal
3. Proper fluxing
4. Assembly and supporting
5. Heating and flowing the alloy
6. Final cleaning

Silver alloy brazing efficiency depends to a large extent on the adherence of the *designer and the brazing operator* to these six fundamentals. To more thoroughly understand the mechanics of these steps, each step should be examined in detail.

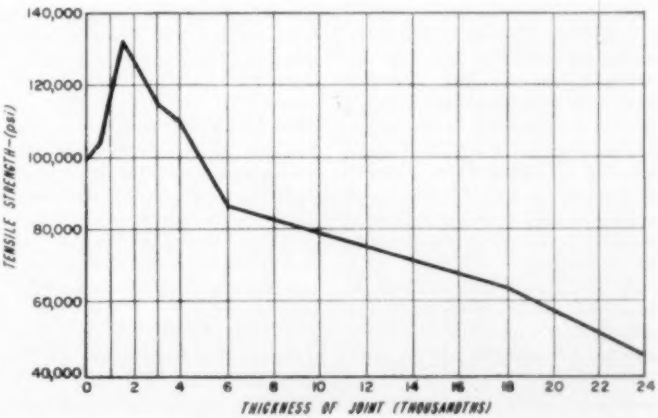
"Good fit and proper clearance" was covered quite completely under the metallurgical aspects of silver alloy brazing. The importance of



Joint strength vs strength of metal joined is plotted at three empirical points for each material. Theoretically, maximum strength should have been obtained in high-speed steel, as this material did not anneal appreciably at the brazing temperature. Instead, failure in these tests was at the brazing alloy-steel interface. The bond was not sufficiently strong to transmit stress which would break the brazing alloy when supported by hardened high-speed steel


SHEAR STRENGTH OF JOINT IN TORSION-(psi x 10³)
Armco iron
1020 steel
4140 steel
18-4-1 HS steel
TENSILE STRENGTH OF METAL JOINED (psi x 10³)

Torsion tests of wiped joints. Two mating surfaces were rubbed together while brazing alloy (Ag-Cu-Cd-Zn) was molten. Graph shows relationship between joint shear strength and tensile strength of the material



Joint thickness vs tensile strength, as plotted, shows a very definite desirability for a thickness range of 0.0015 and 0.002 in. To go beyond this not only decreases the strength, but wastes material and spoils appearance

this step makes it worth repeating. Both for economy and maximum strength, the joint clearance should be kept as close to 0.0015 in. as possible. Another factor, not previously mentioned, is the effect of capillarity which is enhanced by close tolerances. This force draws the molten brazing alloy throughout the joint thus insuring a complete bond. Appearance too, can be an item of concern. The fine line of exposed brazing alloy in a properly made joint can add to the sales appeal of a manufactured article while a large gap may detract from its appearance.

"Clean Metal" is a self-evident requirement. While the brazing flux will protect the metals from oxidation during the heating and cooling cycles, it will not remove oil, grease, excessive rust, or scale present on the metal to be joined.

"Proper fluxing," the third fundamental, means not only sufficient flux of proper consistency, but also the fluxing of the proper area for complete protection. Frequently parts to be brazed are so constructed that direct impingement of the heating flame on, or adjacent to, the joint area, cannot be avoided. In such circumstances an extra quantity of flux should be applied to prevent loss of fluxing action. This loss is a result of the instability of the flux at temperatures in excess of 1600 F. When the flame impinges directly on the flux, it is impossible to prevent the temperature from exceeding the 1600 figure and "spending" the flux.

All areas adjacent to the joint, which require protection from oxidation should be coated with flux. Flux should not be thinned too greatly in order to prevent the loss of protection by an inadequate amount. If Handy Flux is heated to approximately 180 F, it will spread farther, give adequate coverage and economy not obtainable by thinning.

As far as possible, parts to be brazed should be self-supporting or self-jigging to meet the fourth fundamental, "Assembly and Supporting." By this means, the loss of heat to the jig is reduced or eliminated and, of course, the heating time will be shortened. All jigs, where possible, should be designed to prevent heat absorption by the fixture in the joint area. The jig should hold the parts rigidly enough to prevent movement of the parts during the cooling cycle, and yet not prevent normal metal contraction.

Alloy can be applied either by hand feeding when the parts are up to temperature, or by preplacement within or adjacent to the joint itself. The other portion of the fifth fundamental, the application of heat, can be accomplished in a number of ways. Any medium which will heat the joint to the flow temperature of the brazing alloy can be used for silver brazing. Some discretion should be used in the selection of heating methods as the design or components of a part would indicate.

"Final cleaning," sixth fundamental, is usually accomplished by immersing the brazed part in hot water at the completion of the cooling cycle. When the part has cooled to the point where the alloy has solidified, if immersed in water, the flux will either dissolve or flake off the joint area. Attention must be given to the design of the part, in determining the temperature at which to quench for flux removal. The low strength of the alloy at elevated temperatures may preclude any extensive handling of the brazed assembly until the joint has been cooled below 500 F. Normally, hot water should be sufficient for flux removal but in cases of overheating, which will develop excessive oxides, the flux may become so hard and adherent that the steam generated by the process described above, will be necessary for its removal.

PRECLEANING — Any suitable cleaning agent to remove oil and grease, will answer the normal precleaning requirement. Where excess scale and rust or other surface oxidation exists on the metal to be brazed, mechanical cleaning by abrasion or a pickling operation will be necessary.

FLUXING METHODS — Almost any method conceivable by the mind of man consistent with the operation to be performed, is satisfactory for flux application. Perhaps the most common are: (1) the use of a small paint brush and (2) dip fluxing. Other methods used in high production operations are: (1) Dropping from an oil can; (2) Dropping from a stick; (3) Passing between coated rolls.

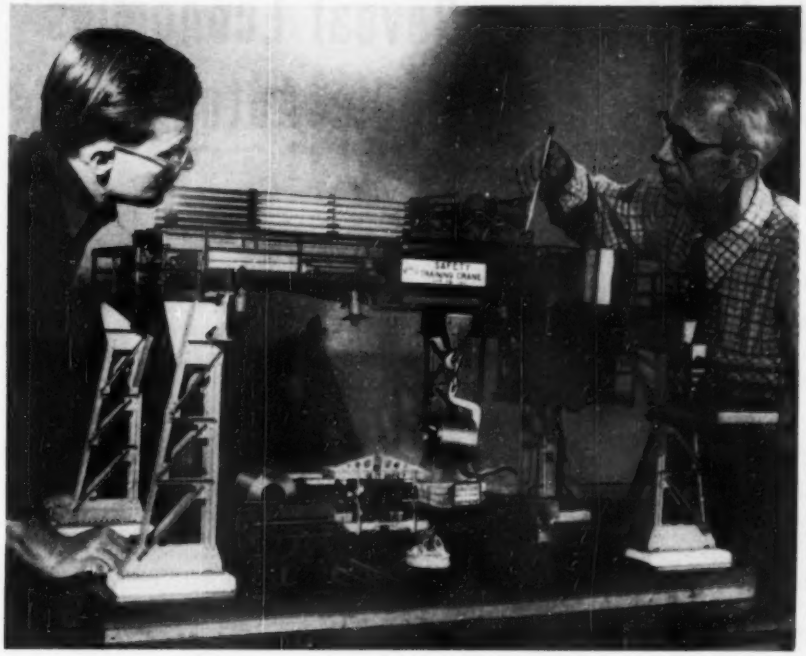
BRAZING METHODS—The most commonly used heating method for brazing is the torch. Various gases or a combination of them are used in torches, e.g. city gas-air, oxy-acetylene, oxy-city gas, acetylene-air, propane-air, and oxy-propane. Although the hand torch is the method in widest use, frequently the torch is rigidly installed for high production in conjunction with a conveying method to provide the speed of operations. Without regard to the order of importance of their usage, some other heating methods are: furnace, resistance, induction, incandescent carbon, dip brazing, and salt-bath brazing.

DESIGN FOR BRAZED PARTS —In designing for silver brazing, the six fundamental steps must be kept in mind. By careful reference and adherence to these fundamentals, the actual brazing operation can be reduced to a simple question of how to apply the heat. Castings, stampings, forgings, screw machine parts or spinnings can be brazed to other parts of the same or dissimilar type by using the six fundamentals as designing aids.

FINISHING BRAZED PARTS— Silver brazing alloys are free flowing at temperature, therefore, no finishing is necessary on properly made joints. Capillary force pulls the alloy into the joint area leaving little or no fillet for subsequent finishing. The economy effected at this point alone can more than equal the material cost.

AVAILABLE FORMS — Silver brazing alloys can be purchased in a variety of rod and wire shapes, as well as sheet, strip, powder form. Perhaps the biggest variety in form is noticeable in the shapes of preplaced alloy. Here either wire or shim stock is fabricated to meet a specific joint requirement.

"Hard Soldering" has been widely used by jewelry and silver craftsmen for many years. Now it is an accepted industrial joining medium. Properly applied it offers many advantages.



Armco Steel Corporation

Miniature crane helps trainees learn how to run a crane safely. Instructor points out details of hoist to Armco man who is taking company's 80-hr training program for crane operators

SMALL CRANE HANDLES BIG TRAINING JOB

A MINIATURE crane, complete in all details, helps would-be operators learn their job thoroughly at East Works, Armco Steel Corporation. Scaled to 1/16 in., the model operates exactly as a full-size crane and is connected to controls the same as those found in cranes in the manufacturing aisles.

During a 10-day, 80-hr, training period, crane trainees learn the essentials of proper crane maintenance, how to operate the controls with assurance, and how to handle heavy loads with safety. When operating the crane, trainees can see the hook at all times and can see exactly what happens with a variety of loads during different moving and positioning operations. As a result, graduates leave the program well prepared for actual shop assignments. Trainees then work with an experienced operator until they acquire the knowledge and "feel" for operating a crane on their own. Delays in production are minimized and the possibility of accident greatly reduced.

Made by a company engineer whose hobby is model building, the miniature crane was put in service a few years ago. Experience since then leads Armco's crane instructors to comment: "It's small in size, but big in its ability to teach safe operations to trainees."

Full-size controls at right are connected to crane so men can see exactly what happens with each lever movement. Loads simulate those actually encountered in production aisles

Detailed Estimates Reveal Economies on Multiple-Spindle Automatics

To get the shortest cycle time per piece, consistent with reasonable tool and setup costs, analyze the cycle in several ways and compare the results

BY HERBERT C. LINDBERG

EACH position on multiple-spindle automatics must do its rated share of work. Very often this is overlooked unless a layout sheet is sketched of the part, the associated tools, and the feeds and speeds are calculated to get each position to do a maximum amount of work. Much time can be saved by using a standard analysis form:

Setup A. . This tooling arrangement is poor for the following reasons:

1. There are several idle toolslide positions, one is an auxiliary position; two idle cross-slide positions and one breakdown position.

2. Form tool is crowded into first position, where centering is being done, leaving the fourth position empty.

3. Form tool is made more expensive by an extra chamfer on off side to break corner. Flat tools should be used instead of circular ones.

4. The 12-sec index is much too slow for competitive standards.

Setup B. . Because drilling is the longest operation, operations were broken up:

Drill one-third deep in 3rd position; drill two-thirds deep in 4th position; drill remainder in 5th position. This will cut down toolslide cam from 11/16 rise to 7/16 rise and 137 rev to to 87 revs.

Drilling can be broken into three steps only where the depth of hole does not exceed 3½ times the drill dia. Deeper holes require a slower feed and smaller rise for each successive step. This will mean more revolutions for first-drill penetration.

Drills can be run at 100 sfpm or higher, so a 1 1/3: 1 speeder will give 110 sfpm, reducing drilling needs to 67 rev.

Drill speeders should only be used when the minimum number of revolutions are needed. They take time to set up and adjust. On most jobs drilling can be broken up without use of speeders, to compare favorably with revolutions for other tools.

Forming. . Design of form tool is selected to give maximum tool life. A flat tool is specified instead of a circular one, because side clearance can be ground to compensate for drag or burn found in form tools with square shoulders. This reduces downtime.

The forming operation is left at the 1st position, because the right-hand side of the form tool will fit between the drill flutes, as is often the case. There is also less chance of chip trouble in this position from toolslide drills. With the arrangement shown, only 67 rev are required for forming and drilling.

Cutting Off. . Cutting-off time is reduced by breaking down and chamfering at the 5th position. This will reduce cutting-off time from 137 to 65 rev. The 5th and 6th positions are linked together, and have the same rise and feed.

Results. . Cycle time is reduced from 12 to approximately 7 sec per pc, or 60% reduction in machining time. But extra tooling reduces machine efficiency from 75 to 70%.

Setup C. . Here is the ideal setup for huge quantities, because setup time and tooling cost will be absorbed easily. Let us analyze the operations:

A 5/16-in. cam rise is needed for each drill. Allowing for approach, the nearest cam rise of 3/8-in. will do. By feeding drills at 0.005 in. per rev, 75 rev will be required. But by using a 1 1/3: 1 speeder, only 57 rev are actually needed.

Forming. . A roughing form tool is used at the 1st position to "hog" out stock for the finish-form tool at the 3rd position and the breakdown tool in the 5th position. To prevent "burning" on the square shoulder of form tool use a 2° pull out angle on square shoulder, thereby increasing tool life considerably. A circular form tool should be used here instead of a flat tool because of the greater tool life. Rough forming requires only 3.70 sec.

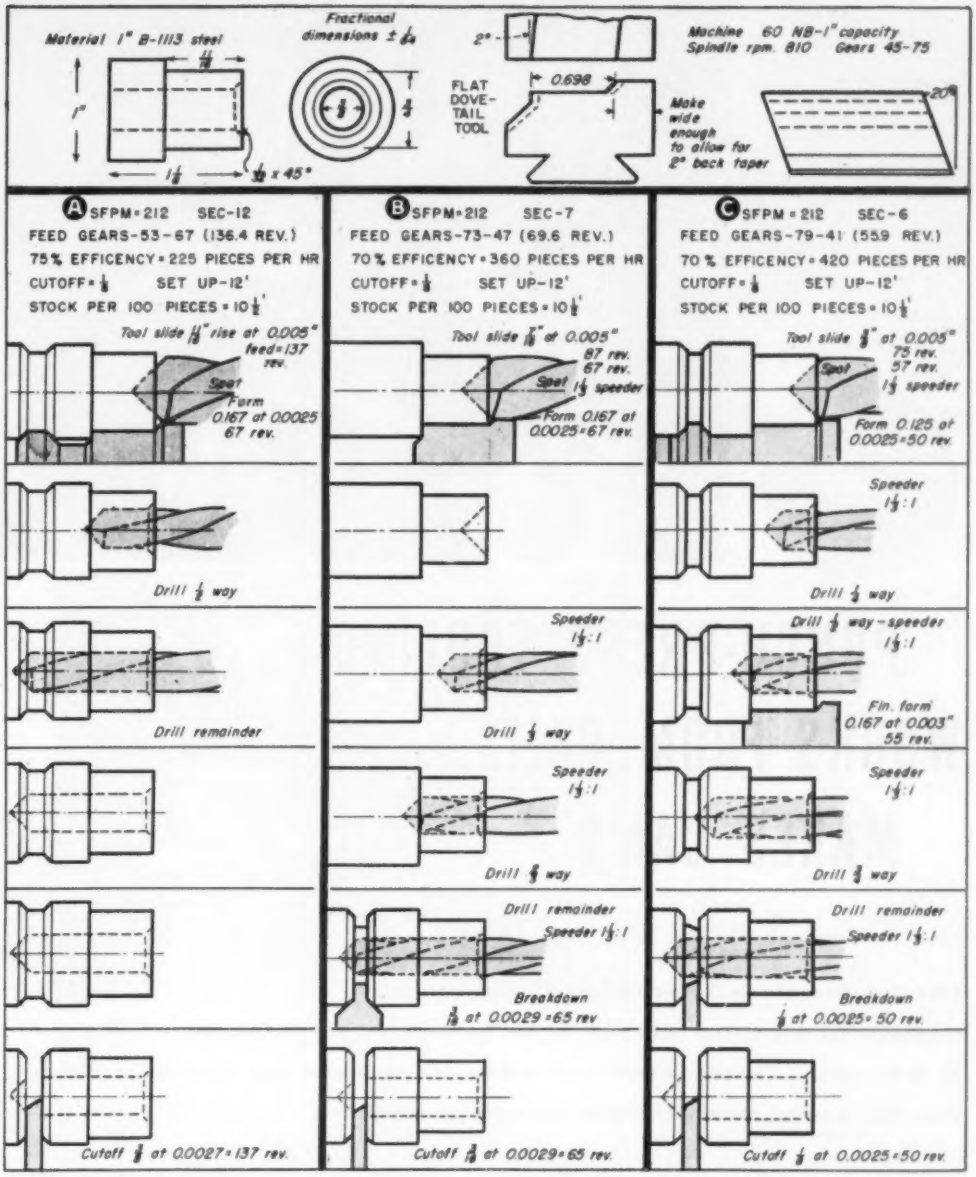
The finish-form tool requires a 0.125-in. cam rise, but the nearest cam is 0.156 in. We can feed this at 0.003 in., which will give 52 rev to perform the operation, or 3.85 sec for the form tool to travel 0.156 in. at 0.003-in. feed.

Where a facing operation is performed on a shoulder and the feed can then be slowed down to a fine feed to finish form the diameter, use a double-rise cam. This provides facing feed for the shoulder and a fine feed for finish forming and dwell. A cam of this sort costs about $25 for the part shown.

Breakdown. . Cutting off in three steps can be done if the two "rings" on the finished part will not be objectionable.

In the first step, the form tool was made flush with the body, thereby not increasing the rise of the first cam. Wherever possible, specify on the drawing if slight steps are permissible. This will help to reduce cutting-off time. The form tool should have slight taper, depending upon depth of breakdown.

For Maximum Efficiency. . To reduce time per piece, the following points must be considered:


Material 1" B-1113 steel
Fractional dimensions ± 1/64
2°
Machine 60 NB-1" capacity
Spindle rpm. 810 Gears 45-75
FLAT DOVE-TAIL TOOL
0.698
Make wide enough to allow for 2° back taper
20°
1/32 x 45°
A SFPM = 212 SEC-12
FEED GEARS-53-67 (136.4 REV.)
75% EFFICENCY = 225 PIECES PER HR
CUTOFF = 1/8 SET UP-12'
STOCK PER 100 PIECES = 10 1/2'
B SFPM = 212 SEC-7
FEED GEARS-73-47 (69.6 REV.)
70% EFFICENCY = 360 PIECES PER HR
CUTOFF = 1/8 SET UP-12'
STOCK PER 100 PIECES = 10 1/2'
C SFPM = 212 SEC-6
FEED GEARS-79-41 (55.9 REV.)
70% EFFICENCY = 420 PIECES PER HR
CUTOFF = 1/8 SET UP-12'
STOCK PER 100 PIECES = 10 1/2'
1
Tool slide 1/2" rise at 0.005" feed = 137 rev.
Spot
Form 0.167 at 0.0025 67 rev.
Tool slide 7/16" at 0.005" 87 rev.
Spot 67 rev.
1 1/3 speeder
Form 0.167 at 0.0025 = 67 rev.
Tool slide 3/8" at 0.005" 75 rev.
Spot 57 rev.
1 1/3 speeder
Form 0.125 at 0.0025 = 50 rev.
2
Drill 1/2 way
Speeder 1 1/3 : 1
Drill 1/2 way
3
Drill remainder
Speeder 1 1/3 : 1
Drill 1/2 way
Drill 1/2 way - speeder 1 1/3 : 1
Fin. form 0.167 at 0.003" 55 rev.
4
Speeder 1 1/3 : 1
Drill 1/2 way
Speeder 1 1/3 : 1
Drill 1/2 way
5
Drill remainder
Speeder 1 1/3 : 1
Breakdown
3/8 at 0.0029 = 65 rev.
Drill remainder
Speeder 1 1/3 : 1
Breakdown
1/2 at 0.0025 = 50 rev.
6
Cutoff 1/8 at 0.0027 = 137 rev.
Cutoff 1/8 at 0.0029 = 65 rev.
Cutoff 1/8 at 0.0025 = 50 rev.

1. Quantity must warrant expense of additional setup time.

2. Quantity must warrant extra tooling cost.

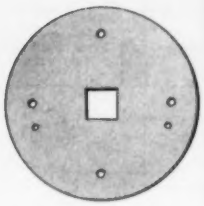
3. Piece must be so dimensioned and of such design that it lends itself to breaking up operations for many tools, each performing at maximum efficiency. In some cases, accumulation of tolerances can cause more rejections and scrap than fastest time per piece is worth. The best way to avoid this situation is to prepare a layout on which feeds, speeds and accumulated tolerances are visualized. Careful layout of forming tools will show which controlling factors on diameters and lengths can be held.

4. Machine must be in excellent shape to withstand a fast cycle.

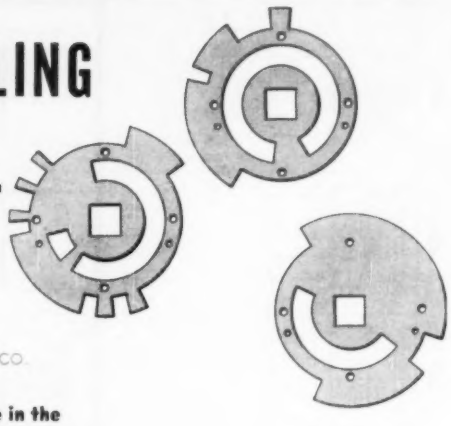
5. Special camming is expensive and the job quantity must absorb the cost.

6. Finally, are properly trained men available to handle modern machines at capacity output?

Operator unloads, loads, and starts one-revolution cycle for four presses in a bank. The 2-in.-dia blanks are handled with tweezers. Uncut blank below and three finished cams show wide range of possible shapes. Stock is 0.020-in. phosphor bronze with silver overlay



PUNCH-PRESS TOOLING WORKS FROM CAMS... MAKES CAMS



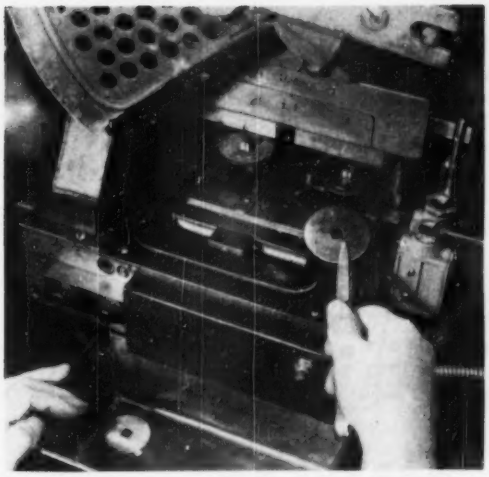
BY J. H. TOMLIN, HAWTHORNE WORKS, WESTERN ELECTRIC CO.

Literally millions of cam-shape combinations are possible in the telephone-exchange contact cams made for Bell Telephone; yet only two punches and two dies do all the work . . . Two cams are cut at a time from same-size master cams in a punch-press setup that allows a switch to a new cam shape in a matter of seconds

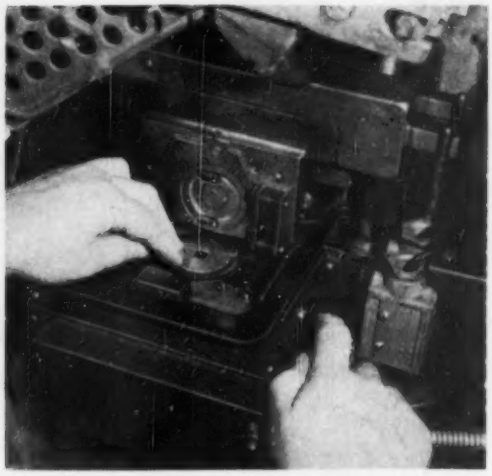
SEQUENCE-SWITCH cams have two cam paths—one around the outside of the disk, and one in a smaller circle inside the edge of the disk. Both are cut in one continuous operation that is completely automatic except for unloading the press, loading new blanks in place, and starting the press.

Each index of the master-cam wheel and the two workholding pilots covers 5° of rotation. The punches actually cut a minimum arc of 10°, so any length of slot from 10° to 355° is possible, and any combination of slots around both cam circles is possible.

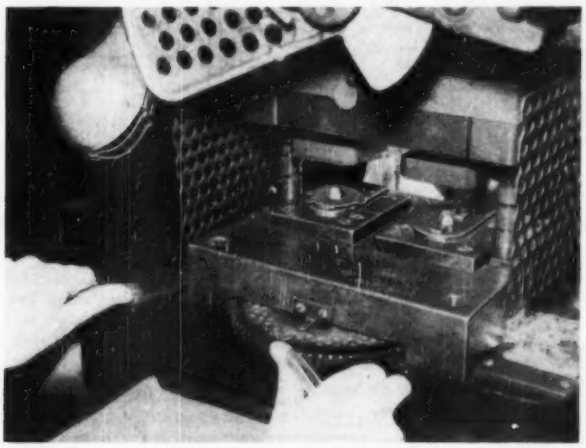
The hand-indexed press—an old setup that was originally used for all production—is now utilized only for cutting duplicates of master cams which are installed in the automatic presses to turn out cams at a high production rate. The method is tedious, requiring hand indexing of the master plate and hand operation of two slides which lower the inner and outer punches into position to cut. The operator must follow a design chart, and



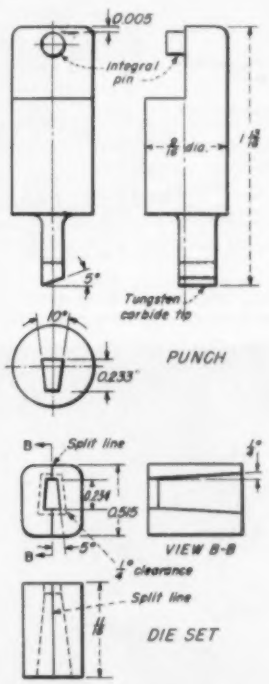
Work pilots are square stubs with keys on one side. Pilots are geared to master wheel under cover plate (in front) which controls rotation



Master cam is upside down on driver in master plate. Small rollers and levers work from master to operate solenoids and punches



Older die set punches duplicate masters from original master made by following cam-design chart. Operator controls indexing and punch location by hand



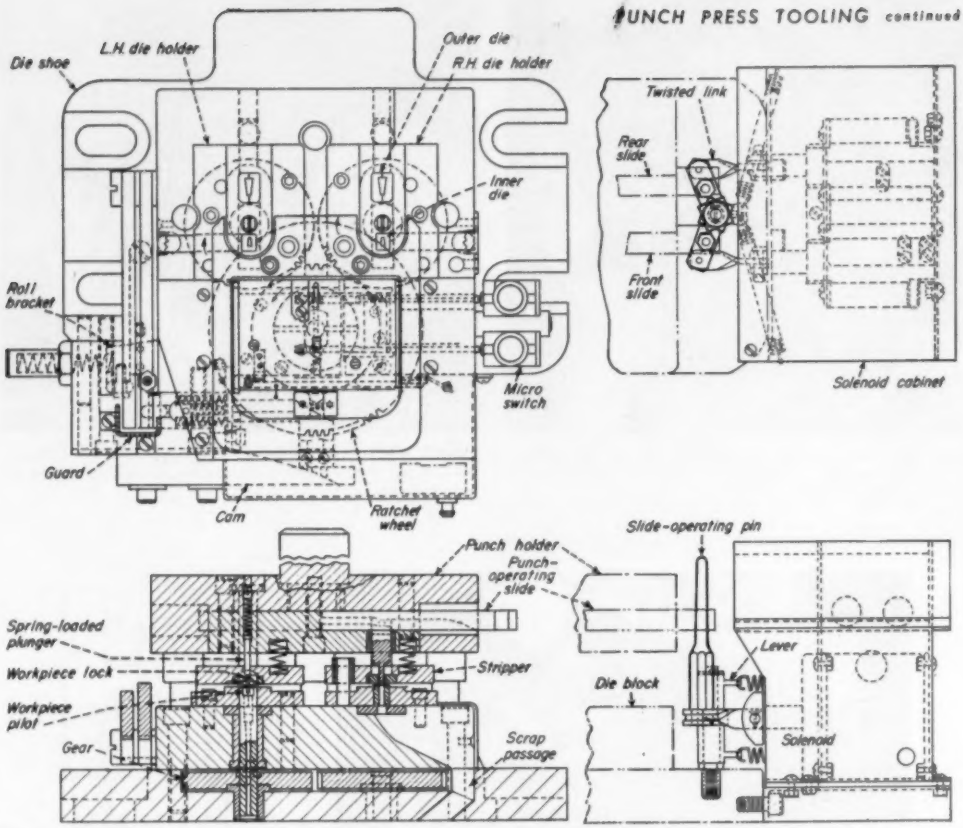
Punches are carbide-tipped, have 5° rake. Die set shown is for inner circle, and is slightly smaller than set for outer circle

only one circle can be cut at a time —which requires two complete revolutions of the cam blanks.

The automatic press does exactly the same job; but rotation of the master plate, which is geared to the two work pilots, is handled by levers and rods working off cams on the crankshaft of the press. Punch control is through rollers and levers that contact the master cam. These operate switches that activate solenoids which move the punches into cutting position.

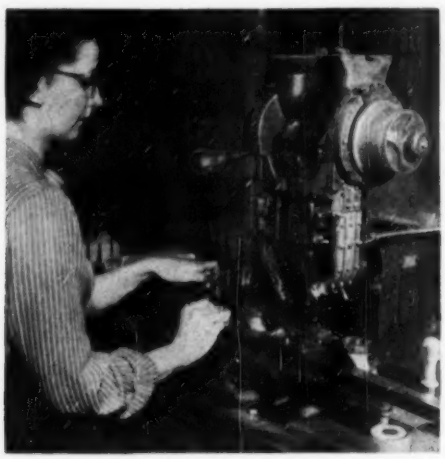
Thus, no attention must be paid by the operator to cam design. Once the master is cut and installed on the stub shaft of the master plate under the cover plate of the die, operation is automatic.

PLEASE TURN PAGE

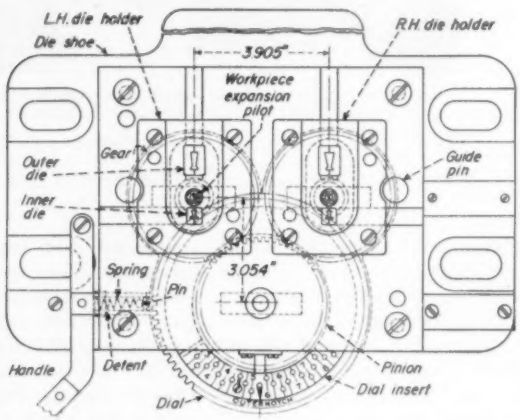


New die set punches production cams from replaceable masters. Punch and master-plate control is completely automatic with each slide controlling two punches

Solenoids operated by switches tripped by the master cam move the punch-operating slides to cut cams. Press stops after 72 strokes

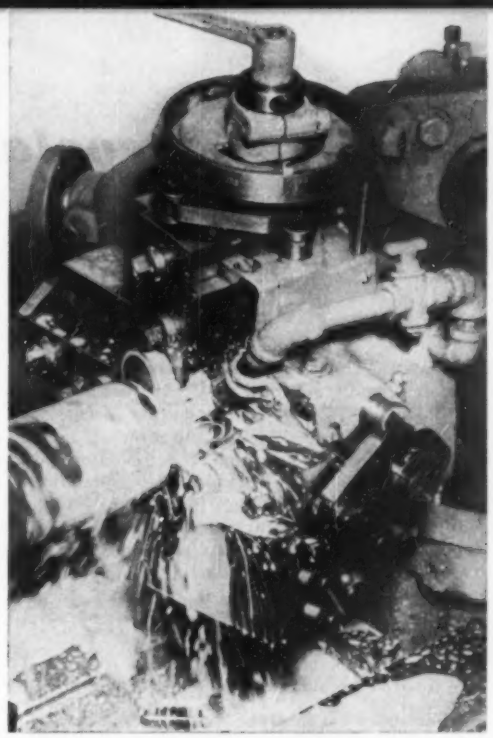


Assembly machine rivets two completed cams and insulating disk together. Double setup has slides working in channel to assemble sequence-switch cams



Die assembly for punching masters has dial plate instead of gear that is operated by levers and rods from cams on press crankshaft. Punches on automatic setup can operate together

HOW TO cut costs with cutting fluids



BY E. J. TANGERMAN EXECUTIVE EDITOR

When I was an apprentice, a quarter century ago, we had soluble oil, water, machine oil for tapping, and a squirt can of kerosene for the tough jobs. If one coolant wouldn't work, we'd try another; if none worked, we'd slow up the job or regrind tools as often as we had to.

In many shops, that's still the situation. A cutting fluid is just something to wet down tool and work and to float out chips. One or two coolants frequently handle all jobs, keeping inventory down and avoiding complications. And the user swears by them, going on hunch rather than on fact.

On occasion, a tough job forces study of the coolant problem. The fluid that solves the problem promptly is considered a nostrum — the answer to any tough job. Like medicine-show snake oil, it is expected to cure anything from chilblains to distemper.

Actually, the coolant can make as much difference in cutting costs as did the shift to carbides — by increasing life between grinds. At the 1947 Machine Tool Show, for example, some units couldn't be kept tooled for a day's run until the right coolant was found. Again, an automatic lathe produced 45 parts between grinds with one coolant, 275 with another. That was on a tough bearing steel; slight corrosion and gumming from the new coolant was unimportant beside the production gain. We have dozens of materials to be cut today — steel isn't steel any more — even stainless alloys vary all over the lot in their machining characteristics. And cutting-tool materials have similarly varying characteristics.

Yet reliable data on cutting fluids are surprisingly scarce. Almost nothing has been published on the subject beyond trial-and-error determinations, which are not applicable on any but the job on which they were achieved — and frequently not even there. As Abe Martin used to say, "It ain't what we know that's important; it's what we know that ain't so."

As a first step towards filling this need, we have assembled here material from five separate reports, one showing a testing procedure, two discussing screw-machine coolants, and two the general theory of cooling. Together, they'll provide you with a basis for studying coolants and some tips on their application, bringing some of the facts out from behind our self-built iron curtain.

This is not a conventional Special Report because it is not complete, but it does provide signposts on the road to coolant economy.

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what does a coolant do?

HEAT, in metal cutting, comes from two major sources[1]: the shear zone *OW*, Fig. 1, subject to plastic deformation, and the tool-chip interface *OT*, where pronounced rubbing occurs. Minor amounts of heat are lost in convection and radiation, and 10 to 15% is stored as latent energy in the deformed chip material. Heat is, of course, a function of cutting forces, and the critical problem in cooling is to keep interface OT cool. At low cutting speeds, deformation in shear zone *OW* is the principal source of interface heat; as speeds go up, temperature rise from tool-chip friction goes up, that from deformation goes down, and the interface heat going into the chip rises (68% to chip at 100 sfpm; 94.5% @ 600 sfpm). Contact area at the tool-chip interface also decreases as speed increases, and all components of forces decline (vertical force goes down 25%, thrust 50%, and friction 50% in an increase from 100 to 600 sfpm).

The friction force along the interface is believed to result from periodic welding and weld rupture at the interface[2]. When an effective cutting fluid is used, welds momentarily established in this manner fail at points at which surfaces went together.

Under less-favorable cutting conditions, the strength of the weld may exceed the plastic shear strength of the chip material, and an appendage called the "builtup edge" may develop along the tool face. Thus the continuous flow of the chip is interrupted because the builtup edge periodically changes size and shape. Tool life, surface finish, dimensional accuracy and power required are all affected.

Tests[2] indicate that cutting fluids are most effective in lowering the interface temperature at smaller depths of cut, and effectiveness of the fluid in lowering temperature there becomes less effective as depth of cut and cutting speed go up. For example, with a cut of 0.0023 in., fluid was effective at all speeds tested (up to 425 sfpm); with a 0.0052-in. cut, fluid was effective to 400 sfpm; and with a 0.0104-in. cut, fluid was ineffective above 200 sfpm. Apparently the fluid either fails to reach the interface at these higher cuts, its reaction is too slow, or the rate of heat generation may be too great for the heat to flow into the fluid in the time available. The conclusion was that at the speeds tested, water-base cutting fluids do more cooling than reducing of friction.

In effect, a coolant has several functions, including lubrication, cooling, and possible chemical action. At low surface speeds, lubricity is the important characteristic, indicating heavy fluids; at speeds above 100 sfpm, cooling becomes the more important. (This same result is reported in recent studies by Field and Zlatin, of Metcut Research.) Hence, at higher speeds, the higher specific heat of water (highest of any fluid) makes it the best coolant, providing rust inhibitors, wetting agents, and disinfectants are added to overcome its negative tendencies.

[1] An Analytical Evaluation of Metal-Cutting Temperatures, by K. J. Trigger and B. T. Chao, Univ. of Ill. ASME semi-annual meeting, 1950.

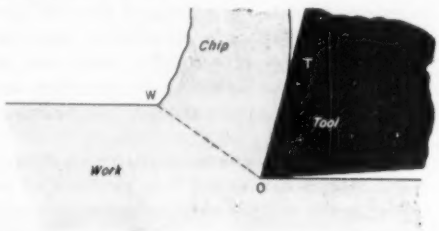


Fig. 1... Sources of heat in metal cutting, with the common Type 2 chip. Line WO is the shear zone, OT the tool-chip interface

[2] The Effect of the Cutting Fluid Upon Chip-Tool Interface Temperature, by M. C. Shaw, J. D. Pigott, and L. F. Richardson, M.I.T. ASME semi-annual meeting, 1950.

correct coolant cuts machining costs 48%

PROPER selection of coolant can make as much difference in machining costs as proper selection of the cutting tool. Dramatic evidence of this is provided by a study P. E. Bundy, chief chemist for Salisbury Axle Works, Fort Wayne, Ind., made of a gear job on a Gleason Revacycle. As a result of his tests, cost per piece was cut on this job 48% by increased tool life, *through change of coolant alone.*

It is important to understand that the answer to Salisbury Axle's problem is probably not the answer to any other plant's problem—unless it be the same in material cut, cutting method, and speed. But the *method* used by Salisbury is a sound approach to an evaluation of coolant economy on any production-machining operation.

Wrote Mr. Bundy about his test:

"Investigations of this type represent a screening method, and as such can serve only as a guide in selecting a coolant. Long-term performance tests are a far better criterion for the evaluation of coolants;

however, performance tests also have many limitations.

"It is important that the reader understand the purpose and intent of the investigation in order to avoid misconceived conclusions based upon the data presented. The range of variation for uncontrolled experiments of this nature is obviously of such magnitude that one observation is of little value. The measurement of tool life is not accurate enough even to attempt to determine the relative performance of each coolant. The report does, however, reliably indicate the wide range of tool performance which may be experienced with the various types of coolants.

"Performance observations made since the investigation tend to support the general conclusion based on the test data. From Sept., '47 to Aug., '48, both sulfurized cutting oils and water-soluble coolants were used on the Revacycles. From Sept., '48, to Aug., '49, mineral-lard oil was used exclusively. Tool costs based on several million gears are:

Period	Gears Per Cutter	Tool Cost Per Gear
Sept. '47-Aug. '48	13,760	$0.0212
Sept. '48-Aug. '49	27,329	0.0110
	Saving . . .	$0.0102

"Under test conditions with at least limited experimental control of the operation, it was possible to produce 30,000 to 35,000 pieces per cutter. Under normal production conditions, however, where tool breakage and hard stock could not be eliminated entirely, production per cutter was 27,329 pieces. Higher tool efficiency is possible with greater control of the operation.

There are, of course, many factors which may have effected the reduction in tool cost. It is my opinion that the coolant was the most important influence."

Salisbury Axle undertook this investigation for just one reason: Tool costs on the Revacycles were excessive. Mr. Bundy knew that controlled experiments under actual operating conditions are best, but difficult, costly, and time-consuming. But uncontrolled experiments are usually questionable, and conflicting views of suppliers make decisions on this basis difficult.

As a compromise, Mr. Bundy undertook an investigation on the basis of uncontrolled experiments, subject to all the errors of working under production conditions, but, if successful, directly applicable to the production job.

The test was made on one operation: cutting 16 teeth on a differential side gear, Fig. 2. Ten different coolants were tested, including three soluble oils, two specialty coolants, a straight mineral oil, and four mineral-oil combinations, some including active sulfur.* The coolants tested may or may not be representative of the type indicated.

All tests were made on automatic-loading Revacycles with standard Gleason cutters 21 in. in diameter having 75 blades in 15 segments. Cutter rpm was 22.6 and the cutting speed was 125 sfpm. Coolant was applied at about 30 gpm through a 1¼-in. pipe above the cutter and a ¾-in. pipe below the cutter. The gear cut is of SAE 8620 forged and annealed with a hardness of 4.7 to 5.0 Brinell. The cutter was an 18-4-1 HSS. Temperature of water-soluble coolants was 80 to 90 F, of oil coolants 110 to 120 F during operations. Smoke from oil coolants was controlled by applying the oil in the proper place and in sufficient quantities to cool chips before they were exposed to the air.

*Active sulfur corrosive to copper at room temperature.

Fig. 2 . . . Automotive differential side gear, a 16-tooth high-production piece of SAE 8620, annealed (4.7-5 Bhn)

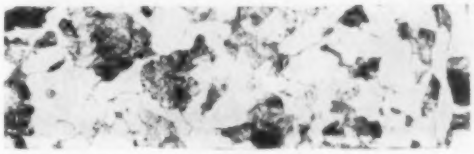


Fig. 2a . . . Microstructure (500X) of the annealed gear stock

procedure

Two machines were used in the test. One was operated with a water-soluble coolant, the other with oil coolant. After two observations (about 1875 pieces) the coolants were switched. After two more observations, the cutters were switched. This procedure was followed to establish a range of variation which might result from such factors as cutter, coolant, machine, and stock. One machine was then identified as a test machine and the other as a control machine. All coolants were tested on the same machine; during the entire test, the same coolant was used in the control machine. By making continuous checks on the control machine under a given set of conditions, it was possible to detect when extreme variation was being experienced as a result of the forging or steel condition.

Tests were discredited and discontinued when stock trouble was evident. This made possible limited control over stock variation. Whenever a new test cutter was required, the cutter was first run for one observation on the control machine. A specified number of pieces was run for each observation regardless of tool breakdown and finish. Some coolants were tested on the basis of 1875 pieces per grind, and others 3000 pieces per grind, depending upon observed performance.

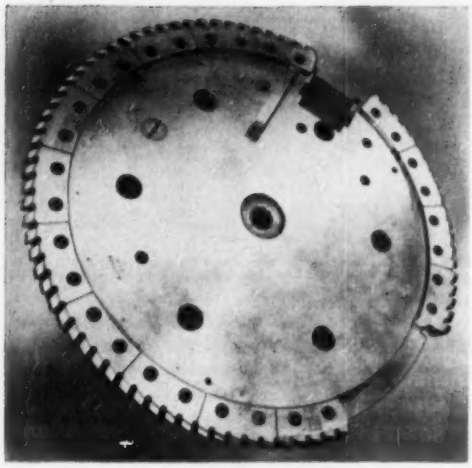


Fig. 3... A Revacycle cutter and one tooth segment. All teeth have 15° back rake, 11° relief

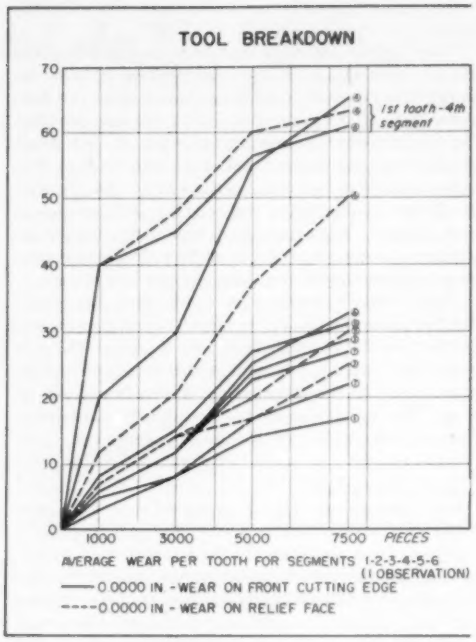


Fig. 4 . . . Average wear per tooth for segments 1 to 6. Solid lines are wear on cutting face, dotted lines on relief

Before a test cutter was put on the machine, the radius from cutting edge to the center of the tool holder was determined with a micrometer on each of the 75 teeth. After a specified number of pieces had been cut, the cutter was permitted to cool to room temperature and the radius of each tooth determined again. The sum of the difference in the radii before and after use was reported as total wear and represents the measurement of tool breakdown on the front cutting edge. Measurement of wear on the finish teeth has little significance because it was so slight that it could not be determined accurately. However, wear on the roughing teeth varied from 0.0022 to 0.0102 in., and could be determined with the same degree of accuracy.

Every test cutter was ground by the same operator on the same machine, and each tooth was inspected following successive grinds as the cutter rotated. Cutters were ground with a 180 Sterling wheel using sulfur cutting oil as a coolant. When all evidence of wear or peel had been ground out, the amount of stock removed, as determined by the machine fed, was recorded for each tooth.

The sum of stock removed to clean up each tooth is reported as total grind. Average stock removed per tooth on 15 roughing teeth is reported as such. Stock removed to clean up the worst peeled tooth on the cutter is reported as maximum grind.

coolant evaluation

To evaluate the coolants, five factors were observed:

1. Total grind—the sum of stock removed to clean up each of the 75 teeth in the Revacycle cutter (above left).

2. Average grind—the average of stock removed per tooth for 15 roughing teeth segments 3, 4, and 5, Fig. 4.

3. Maximum grind—grind necessary to clean up the tooth having the greatest peel.

4. Total wear—sum of the wear on the radius of each of the 75 teeth.

table I . . . TOOL

Coolant	Concentration	Average Wear per tooth on radius of segments 3, 4, 5	
		1875 pc grd	3000 pc/grd
Transparent soluble oil	1-20	0.0058 ± .0008	
Transparent soluble oil	1-3	0.0044	
Transparent soluble oil	1-100	0.0072	
Mineral oil with 1% sulfur		0.0057 ± .0007	
Mineral oil with .5% sulfur	1-1	0.0038	
Paraffin oil (100 SUV) @ 100 F		0.0022	0.0035 ± .0006
Mineral-lard (5%)-sulfur (1.25%)		0.0056	0.0066
Milky soluble oil	1-10	0.0040	0.0084
Heavy-duty sol. oil with fats and sulfur	1-15 1-3	0.0058 0.0046	
Specialty (emulsion)	1-10	0.0041	
Specialty (solution)	1-15	0.0062	
Mineral lard (paraffin oil 95%, lard oil 5%)			0.0025 ± .0003
Mineral, lard, sulfur, chlorine — a broaching-type oil			0.0102

Note: Plus and minus values represent observed range.

5. Average wear—the average wear on radii of 15 roughing teeth segments 3, 4 and 5. After a cutter has been used and each tooth cleaned, the builtup edge interfered very little with this measurement.

The observations indicated by the terms "grind" represent wear on the relief face of the tooth and were measured by determining the feed of the cutter grinder necessary to grind out all evidences of wear or "peel." The term "wear" represented the reduction in the radii of the cutter measuring with a micrometer from the front cutting edge. Tool life of a cutter of this type is controlled by the roughing teeth. Thus segments 3, 4 and 5 generally show greatest wear. Measurement of tool breakdown on these teeth is probably the best criterion for evaluating tool life. However, reporting total breakdown on all 75 teeth presents an over-all evaluation including both finish and roughing teeth.

Of the materials tested, a mixture of 95% paraffin oil (100 SUV at 100 F) and 5% lard oil provided the greatest tool life. With this coolant, 3000 pieces could be produced with a total loss or grind of 0.025 (based on *maximum* grind, not *average* grind). Under normal conditions about 30,000 pieces per cutter were produced. Finish proved satisfactory with all ten coolants. Active sulfur in cutting oils was apparently detrimental in concentrations of 0.5% or more. Lower concentrations were not tested. Maximum tool life was obtained by running 3000 pieces per grind, but 7500 pieces were run on one cutter before tooth contour was lost.

chips... appearance, behavior

Chips produced with water-soluble coolants were characterized by being the color of clean metal and flat. The chip would curve slightly as the cutter wore. With oils containing corrosive sulfur, chips were blue or black in color, indicating high temperature and were curled up like little cylinders. Both conditions were exaggerated as the tool wore. Chip formation with oils containing no corrosive sulfur was similar to that with water-soluble coolants; flat chip with no discoloration. These observations refer specifically to roughing teeth.

With water-soluble coolants, chips had a tendency to stick to the front cutting edge and when removed, left a comparatively large builtup edge of work metal on the tooth. Atfer 1875 pieces had been run with soluble oil, the cutting tooth showed only slight wear on the front face or rake face just below the cutting edge. The front cutting edge itself was worn to a considerable extent. The relief face was comparatively worn or peeled to the extent indicated on the chart. Wear on the relief face usually started on the corners. Wear on this tool area resulted in excessive grinding in order to clean up the cutter.

Corrosive sulfur oils resulted in the chip curling under the front cutting edge and sticking tenaciously to the tool after the cut was made. This condition became worse as tool wear increased. However, when the chip was removed, it broke free and left little or no builtup edge on the tooth. Wear on the front cutting edge and wear on the relief face was about the same as that experienced with soluble oil, but there was less tendency for the tooth to peel at the corners. Wear was more or less even across the cutting edge.

Sulfur oils caused extreme wear on the front face (rake face) just below the front cutting edge. This tended to weaken the cutting edge and eventually caused the edge to wear back on the relief face.

With non-cororsive cutting oils, paraffin oil and paraffin lard, the chips had a tendency to fall free of the tooth. When the chips did stick, adherence was slight and they could be removed easily. A very small builtup edge existed with this type of coolant. On both front cutting edge and relief face, there was less wear with this coolant than the other two types. Wear on the front face was about the same as experienced with soluble oils.

tool wear

It was a common experience with all coolants for one tooth to wear to a far greater extent than all the

WEAR *(All measurements in inches)*

Average Grind per tooth on relief face of 3, 4, 5		Total Grind		Maximum Grind		Observations	
1875 pc/grd	3000 pc/grd	1875 pc	3000 pc	1875 pc	3000 pc	1875 pc	3000 pc
0.050 ± .013		1.8755 ± .3255		0.072 ± .012		4	
0.047		1.6392		0.060		1	
0.045		1.5718		0.060		1	
0.035 ± .010		1.3747 ± .3565		0.040 ± .007		9	
0.026		1.0925		0.035		1	
0.021	0.024 ± .006	0.8276	0.8989 ± .1978	0.022	0.037 ± .008	3	11
0.030	0.036	1.2325	1.2797	0.034	0.047	1	1
0.035	0.061	1.2798		0.047	0.073	1	1
0.036		1.3995		0.054		1	
0.035		1.2544		0.054		1	
0.027		0.9158		0.041		2	
0.036		1.3050		0.047		1	
	0.019 ± .003		0.7379 ± .1891		0.024 ± .006	4	
	0.062		2.3096		0.085		

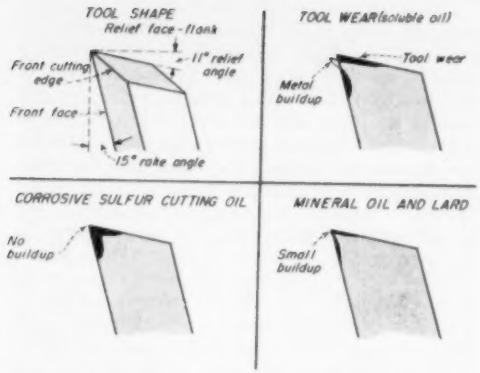


Fig 5... Effects of coolants on roughing teeth

other teeth. This was probably caused by the material being machined, but there seemed a greater tendency for this condition with the water-soluble coolants.

Greatest rate of wear on segments 2, 3, 4, 5, 6 occurred during the first thousand pieces and after 3000 pieces. Considering only total tool life, there seems to be little danger of running the cutter too long, provided conditions are normal and tooth contours are maintained. Abnormal conditions such as dirty steel might, of course, damage a cutter if it were run too long. In view of the experience of this test, it would appear undesirable, when grinding the cutter, to grind out peel on one tooth completely if it were the only tooth worn to that extent. The tool loss resulting from grinding out wear on the bad tooth would be great. If, however, two or three teeth in succession show extreme wear, it may be desirable to clean up the cutter completely when grinding.

recommendations

Inadequacy of the data in this report for evaluation of coolants is freely admitted. However, as these data happen to be the only evidence available for coolant selection on this particular operation, it became the basis for the following three recommendations:

1. Coolant, 5% lard oil, 95% paraffin oil.
2. Run 3000 pieces per grind, inspect cutter regularly.
3. If one and only one tooth in any one segment is peeled to a much greater extent than the others, do not try to clean up the one bad tooth when grinding. If the teeth in any one segment are fairly evenly worn, clean up the entire cutter.

In recommending mineral-lard oil as a coolant for Revacycles, no claim is made that it is the best coolant. However, it is believed to be the best of the group tested. Of far greater significance than the measurements indicated on the charts was the fact that results obtained with mineral-lard oil had been consistently reproduced during the past year with what is considered reasonable variation and tool costs have been substantially reduced.

what about dual-purpose coolants in screw machines?

TESTS OF "water-base, dual-purpose" oils by The New Britain Machine Co. have indicated that skepticism, based on inherent fear of water in any form entering a lubricating system, is unjustified*. Many companies using screw machines have hesitated to use these oils because of fear of damage from poor lubrication or rusting, although they freely admit that their inability to keep coolant out of the lubricating system during conventional operation is likewise cause for concern.

In these tests, two identical batteries of New Britain screw machines, of two sizes, making identical products under identical machine and tool setting, were lubricated in one case with the dual-purpose oil, in the other with a paraffin-base oil (viscosity 265-285 sec @ 100F, SUV) for lubrication and a paraffin cutting oil with sulfonated base added (viscosity 115-125 sec @ 100F, SUV). Machine parts, such as spindle bearings, slide ways and carrier stem surfaces, which would be first to show insufficient lubrication, were carefully examined before and after tests.

During the 5-month test run, records of all oil additions, tool grinds, machine breakdowns, pieces produced, and machining characteristics were kept.

The dual-purpose oil proved not to have the necessary qualities for heavy forming—forming tools required regrinding twice as often as on machines with mineral-oil coolant. Conversely, all end-working tools (drills, reamers, and counterbores) showed longer life with dual-purpose coolant. Materials machined were among the toughest available: NE 9450-CRS, beryllium copper (half hard), AMS-6327 steel (R. 26-32). No tests were run on any freer-machining steels, on which an appreciable increase in tool life *might* have been obtained.

Initial mix of the dual-purpose oil for both coolant and lubricating sumps was 5 parts water to 1 part concentrate. Makeup was 9 parts water to 1 of con-

* A gear-cutting machine manufacturer is currently testing dual-purpose coolants in broaching HSS. Results thus far are good.

centrate because loss of water from evaporation was expected to be greater than that from dragout. Later, makeup concentration was reduced to 15 to 1 because the 9 to 1 makeup was increasing concentration in sumps.

Lubrication efficiency of the dual-purpose oil proved equal to that of the conventional mineral oil. There was no galling, pickup, or corrosion of bearings or ways. In fact, to create the worst possible condition for corrosion, one test machine was shrouded with a canvas tarpaulin at the end of the run and allowed to stand that way four months. No corrosion or galvanic action was found.

Conclusions thus are:

1. Water-base dual-purpose oils lacked some qualities as general-purpose coolants.
2. They perform satisfactorily as lubricants.
3. They have excellent anti-corrosion qualities.
4. They are much better refrigerants than mineral oils.
5. They are about one-third as expensive to use.
6. If properly used, they are equal to mineral oils except where oils are specially compounded.

Possibly greater benefits could have been obtained from the water-base coolant had the tool design, feeds, and speeds been studied. In this test, no deviation from standard practice from mineral-base coolants was made.

success depends on four factors

Successful use of dual-purpose oils in screw machines seems to be based on these four factors:

1. Choice of a compound with sufficient lubricity and anti-oxidation characteristics both to lubricate and to protect machine members. This is a chemical matter and must be "built into" the coolant by the *maker.*

2. Thorough study of tool design. This must be done by the *user,* and design must compensate for increases listed under 3.

3. Full use of the refrigerant properties of the coolant—again the responsibility of the *user.* Water has roughly twice the heat-removing properties of oil, so either speeds, feeds, or both, can be increased when water is used, thus doubling the energy (or heat) in the form of chips flowing over the cutting edges of the tool. Simply replacing mineral oil with water-base dual-purpose oil will result in little or no gain; factors must be adjusted to suit the new coolant—as Salisbury Axle discovered.

4. Control of concentration and contamination of the water-base material. A regular program of cleaning of the machine will eliminate this danger. Here "an ounce of prevention is worth a pound of cure." This problem is discussed later.

The report shows these advantages for dual-purpose oil: Eliminates chip cleaning, oil reclamation, need for two types of oil; lessens fire hazard; removes smoke haze in department; is a temporary rust preventive, but requires no degreasing before subsequent handling; lessens danger of skin infection and can be disposed of in any sewer; costs less per piece; can be distributed from a central system; usable on all materials except magnesium; should increase machine productivity.

Successful use of water-base oils is largely up to the user. Regardless of the materials used, or in what manner, rigid and constant control of concentration is essential. Regularity of makeup additions cannot be overlooked. A careful analysis of parts in the machine using the coolant should be made prior to initiating the change. *Look out particularly for water-soluble parts such as clutch disks.*

plant uses dual-purpose coolant

Ralph Hause, president of Hause Valve Company, Montpelier, O., has been using a dual-purpose coolant in screw machines for about two years. His initial experiences have been reported (*AM*, Dec. 15, 1949, p. 105). Supplementing those remarks, Mr. Hause has just written us:

"We are still using this type of coolant in our own shop, and feel that we are making a considerable saving by doing so.

"When this coolant is placed in the machine it is very important that all possible grease lubrication be removed from the bearings and the machine thoroughly cleaned at all points where possible. During the first few days of operation, pay particular attention to the flow of oil to determine if all moving parts are actively lubricated; by this, I mean that you should watch to see that there is a flow or splash of oil to all moving parts, at least sufficient to keep them wet. This procedure is very important; you may find it necessary to install additional oil lines to certain points in order to satisfy this requirement.

"This material, being a water-mixed solution, is more difficult to handle with the pumps in your machines; and if they are slightly worn, you may find they will not deliver sufficient volume to do the job as with oil. In our own shop when this condition has arisen, we have corrected it in two ways: first by purchasing and installing new complete pumps. We have found in the case of one make that the pump in the lubricating-oil system does not have

. . . rigid control of concentration is essential

much extra capacity; therefore needs to be in excellent condition in order to be able to handle the job with this water solution. We have replaced lubricating-oil pumps when casual inspection indicated they were still in good condition. I think the type of filter used on these machines considerably retards the flow, and you will probably find that the filter elements need to be changed after two or three hundred hours of operation.

"In a few words, it looks to us like the most important things to remember are to get the machine cleaned up and the grease out and to be sure the water compound gets in the place to do the job for which it is intended."

what contaminates water-base coolant?

WATER-BASE coolants have been used successfully for some time, but two problems have deterred many plants from using them; odor and corrosion properties—but as the odor increases the anti-corrosion properties disappear.

Tests by The New Britain Machine Co. show that water-base coolant in a new machine—or one in which mineral oils have been used—has little tendency to develop odor in the first six months, but the second (replacement) batch develops odor in less than three months, the third and fourth batches each develop odor more rapidly than its predecessor. This finding led to the assumption that bacteria which grew in the first water-base batch contaminated succeeding ones. To test it, samples of freshly mixed water-base coolants were put in sterile flasks and aerated for 10 hr per day for 4 mo. Even under this accelerated treatment, there was no sign of odor, and freshly polished steel was not corroded in them. Similar samples were put in dirty scoops that had been used for a long time previously to measure coolant for mixing in the machines. After four days of aeration for 10 hr a day, odor in each sample was intense, and freshly polished steel samples developed rust in 48 hr.

Antiseptics in the mixture were ruled out because carelessness in making additions might readily result in concentrations too high for operator safety, because most antiseptics evaporate more slowly than water, which builds up concentration; and because antiseptics added in safe proportions would never kill all the bacteria. Further (as recently discovered in the use of penicillin on humans), bacteria not destroyed soon built up a resistance to the antiseptic so it had no lethal powers.

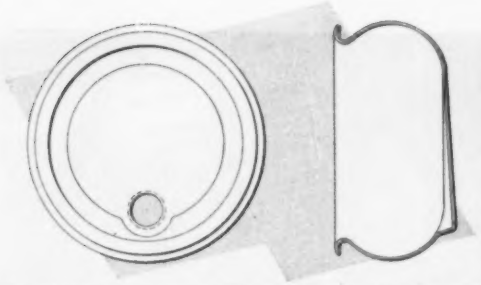
The alternative is to rid the machine of bacteria *before* adding the water mix, then to drain all solution at least every six months and to make the machine as nearly sterile as possible before replenishing with new solution. Tests prove that this routine practically eliminates bacteria contamination and resulting odor and loss of anti-corrosive properties.

Here's the procedure:

1. Remove old water-base solution, on weekend if possible.
2. Remove all chips and accumulations of sludge and "gunk" from the sump.
3. Fill sump with antiseptic, mixed as specified by maker. (Be sure it covers sump tops. Wear rubber gloves and goggles when using antiseptic. If the cleaning solution touches the skin, wash off with clean water at once to prevent burning).
4. Open all valves and fittings wide, remove pumps and clean off slime and deposit, then replace.
5. Circulate solution for at least 30 min. Use a stiff brush to clean all surfaces not reached in normal circulation of solution.
6. Allow machine to stand over weekend, if possible, so antiseptic will penetrate all crevices and pores thoroughly.
7. Drain antiseptic and clean new sediment from sump.
8. Fill sump with clean water and circulate for 30 min. Be sure surfaces brushed with antiseptic are thoroughly flushed with clean water.
9. Drain off rinse water.
10. Refill with fresh coolant.

Occasionally, other sources than bacteria cause contamination. If acid fumes are present (near steel mills or plants burning sulfur-bearing oil, gas, or coal), the solution tends to turn acid with protracted use. Location near a plating room or chlorinated solvent degreasers may result in contamination, also "second operations" on pieces not thoroughly cleaned of heat-treating salts. Usually, a process of elimination will locate the source of contamination, and suitable countermeasures can be devised—if bacteria have been eliminated first.

. . . suitable countermeasures can be devised



Deep-drawing forms supply cans from 0.037-in. stainless strip. After hydraulic bulging, insides are polished to matte finish. Final operations are lip-turning and piercing

Polish Starts With Limestone

BY L. W. COURT, Mechanical Engineer
INTERNATIONAL HARVESTER CO.

Imaginative equipment converts the job of polishing creamery supply cans into an automatic process

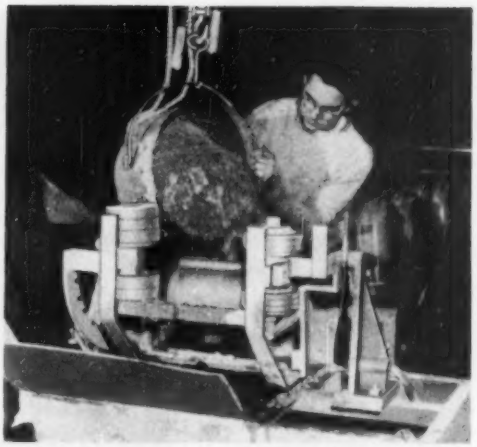
CREAMERY equipment not only has to *be* clean; it has to *look* clean, too, or it just won't sell. To produce a fine matte finish on the inside surfaces of cream-separator supply cans, old methods would take too many manhours for modern production.

The finish not only has to look good, but must be truly uniform, with no pits or cavities in which dirt might lodge.

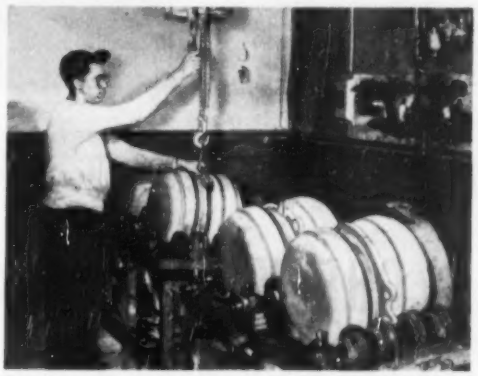
A group of three double racks which will tumble 12 cans continuously were fitted with electric motors (to rotate them at 50 rpm), timers (to provide an automatic 24-hr cycle), and air cylinders (to tilt the racks at 10° from horizontal). A 5-in. stroke on the cylinders allows tilting the racks first to right for 12 hr, then to the left for the last 12 hr; insuring that the limestone material will produce fine, crossed lines inside the cans.

Limestone that will pass through a 1½-in. screen is dumped into one can at the filling-and-dumping rack, which will tilt over a drain bucket. After water (7 qt) and detergent (8 oz) have been added to bring the level of material almost to overflowing, a second can is clamped over the first, with a rubber gasket between them. An overhead hoist makes shifting the set of cans to the racks a simple chore.

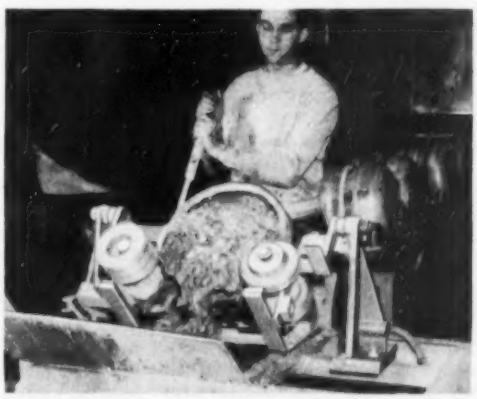
After the tumbling cycle, the cans are dumped and each is placed over a rotating spray cleaner—much like a dishwasher—that flushes out the remaining limestone slurry.



Filling calls for crushed limestone, water, and detergent. Cans are clamped face-to-face with rubber gasket between to prvent leaks. Clamp ring locks cans together



Tumbling cycle calls for 24-hr cycle on rubber-faced rollers. Air cylinders tilt racks 10° to each side for 12 hr. Controls for each stand set of two racks is automatic through timers



Dumping drains used limestone from can into perforated bucket which passes slurry, retains limestone pieces. New charge is used limestone, new stone, water, and detergent

Electronic hardness testing

Chevrolet rocker arms are checked for hardness in four specially designed machines in back of two girls, upper right. Combined output of four units is 10,000 pc/hr. Each girl feeds two units by loading belts that move arms into tester. After test, "good" rocker arms move on belts into hoppers in foreground. Girls then sort intake and exhaust rocker arms and visual inspect for defects

NEW PROCESS

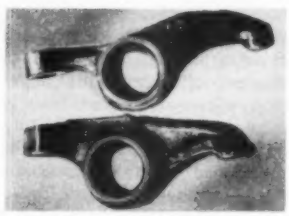
CHECKS HARDNESS ELECTRONICALLY

Automatic electronic tester with mechanized parts handling permits 900% production increase . . . Machine eliminates human errors in non-destructive testing of heat-treated ferrous materials

BY CHESTER RICKER, Detroit Editor

THREE YEARS AGO, the Plant Engineering and Electrical Departments at the Central Foundry Division of General Motors Corporation, Saginaw, Mich., thought that an electronic hardness tester could be made. At that time, girls hardness-tested rocker arms for automotive engines by grinding a test spot and Brinelling each piece at this point. Two operators turned out about 1000 pc/hr. Today, with electronic testers, two girls now can turn out 10,000 or more pc/hr. Three Brinell machines have been replaced by each tester, the process is non-destructive, and checking is more accurate, as the possibility of human error is eliminated.

Behind the development of this new testing process was the need for 100% inspection on "Arma Steel" rocker arms made for Buick, Cadillac, Chevrolet, and Oldsmobile engines. All of these rocker arms are heat-treated and must be held within 0.10 Brinell at both the high and low ends. As arms must be rejected if either too hard or too soft, two inspections must be made simultaneously. If rejected for either reason, rocker arms are



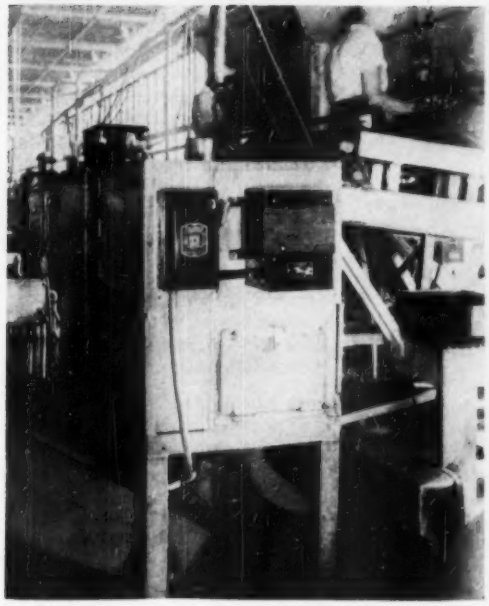
Buick, Chevrolet, Cadillac, and Olds rocker arms must Brinell between 163-207 after heat-treating pad, which is dipped ¾ in. in lead for 5 min, then quenched in oil

Rocker Arms Must Meet These Hardness Specifications:

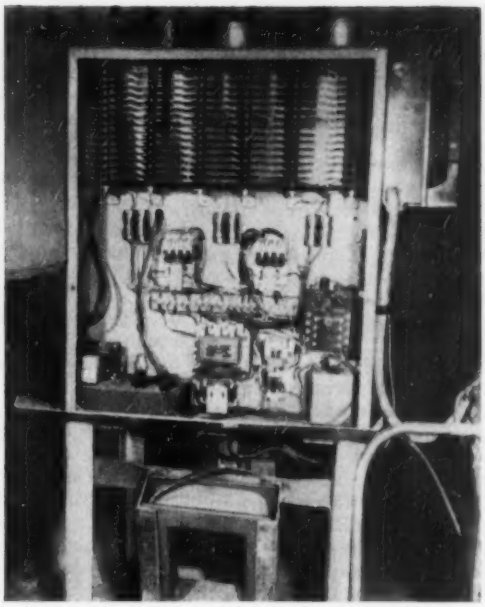
LIMITS	PASS	REJECT
High	4.7	4.8 Bhn
Low	4.2	4.1 Bhn

Material: Arma Steel Alloy

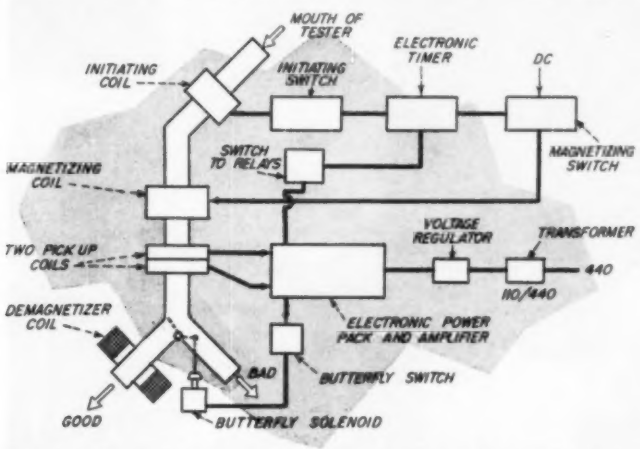
C	= 2.60	S	= 0.115
Si	= 1.35-1.40	P	= 0.05
Mn	= 0.40	Cr	= 0.02



Testing machines..Rocker arms feed into machine from belt at top, discharge through solenoid-operated selector valve at bottom. Valve chutes "good" parts to belt at left, but directs rejects to long belt at right



Three rectifiers at top provide dc for operating magnetizing coils. At center is magnetizing switch, at right with dials is electronic timer, and at left are controls for adjusting pickup currents. Demagnetizer coil is at bottom



Operating diagram..Passage of rocker arm through initiating coil induces current that trips switch to energize magnetizing coil. Cycle, controlled by timer, is preset to saturate piece, then cut off, permitting piece to fall. Falling magnetized piece induces current in pick-up coils circuit, which operates selector valve to pass or reject piece. Induced currents are proportional to retained magnetism in rocker arm and thus to hardness of arm

sent back through heat-treatment, which usually corrects the fault.

The new hardness tester depends on the fact that magnetic retentivity is a function of the hardness in ferrous metals and that the harder the casting, the more magnetic lines of force it will retain when magnetized by a constant force.

The tester acts as a comparator and for each size or type of rocker arm is adjusted to standard Brinell-tested arms which are correct for the high and low limits. Two rocker arms are used at each end of the scale, each separated by only 0.10 point Brinell reading. There are two electric testing circuits each with an electronic bias rheostat adjusted so the machine will pass the lower-hardness rocker arm at the high limit but not the higher-hardness one. Similarly the second pickup circuit is adjusted for the two low-limit standard arms. These are passed through the machine and the proper bias set so the low one will be rejected but not the higher one.

By adjusting the tester to standard rocker arms, one machine can process any of the four types of rocker arms which are tested by the thousands each day. Human error of observation is eliminated and it is only necessary at routine intervals to check the tester adjustment by passing the standard

rocker arms through its test zone.

During test, "good" rocker arms are separated from the rejects. The latter go to a tote box beneath the tester; the "good" pieces go via belt conveyor to hoppers where they are visual inspected and sorted. Chevrolet intake and exhaust rocker arms are not exactly alike, so they are separated visually, although they do not require a different adjustment of the electronic tester.

Timing Is Preset

Eact tester is arranged in a steel cabinet which not only protects the electronic units but also shields them from stray magnetic or electric fields. As a piece slides down the inclined portion of the inspection tube it first passes through the initiating coil inducing a current that trips a switch causing the magnetizing coil to be energized. In the magnetizing circuit is an electronic timer that holds the current on for 0.35 sec. This has been found enough to magnetically saturate the rocker arm properly. This timing would handle 10,000 units per hour.

Saturation Is Uniform

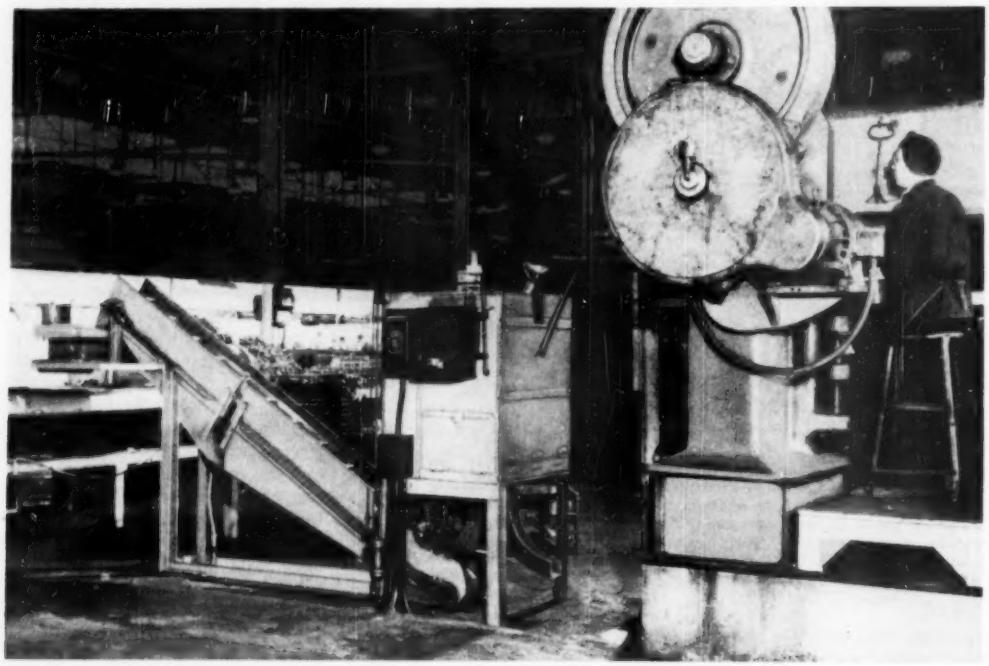
The magnetizing coil always pulls the test piece to its magnetic center for saturation. It pulls the arm down if it is slow in falling or pulls it back if it falls too fast. Hence the amount of saturation is uniformly controlled and each piece drops exactly the same distance.

At the end of the saturation period the electronic timer cuts off and the magnetized rocker arm falls by gravity to a selector "butterfly" valve. The latter is operated by a solenoid and for safety is always set in reject position so failure of any electric circuit will reject all test pieces thereafter.

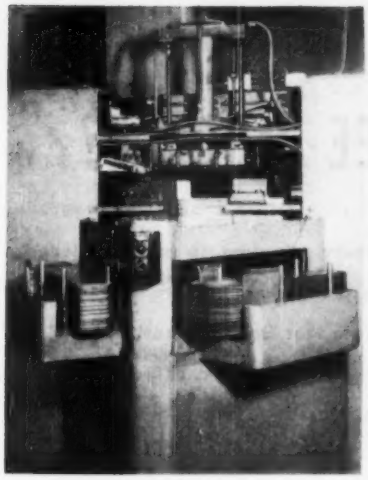
Between the magnetizing coil and the butterfly valve is a double wound pickup coil. One circuit responds for the high and one for the low limit of hardness. The falling magnetized test piece induces current in the pickup coil control circuits that operate the "butterfly" selector valve. As the test piece has a free fall over a fixed distance, the currents generated in the pickup coils are proportional to the retained magnetism in the rocker arm and therefore are a true measure of the hardness. These minute currents are amplified and passed through Thyratron tubes which operate the relays that control the "butterfly" selector valve.

Both Limits Are Satisfied

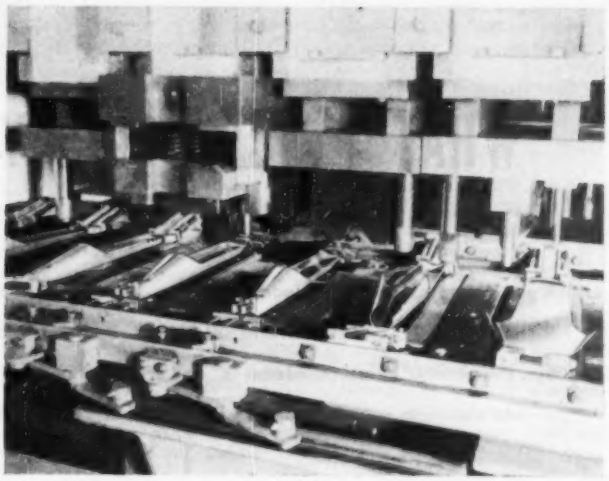
Both relays are connected in series with the solenoid so both high and low limits of hardness must be satisfied or the "butterfly" valve will remain at "reject" position. When the solenoid operates, the rocker arm falls out on the "good" side and passes through a demagnetizing coil as it drops onto the inclined delivery conveyor.



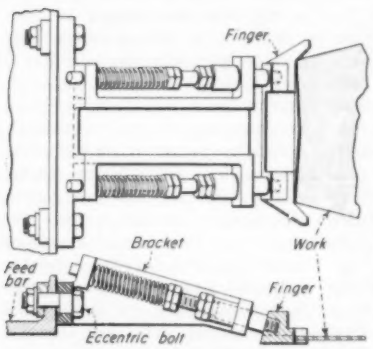
Coining and Testing..Latest development in preparing rocker arms for Buick is to coin in press, then feed automatically on conveyor to electronic hardness testing machine. Feed rate is 3600 rocker arms per hour. After test, inclined conveyor elevates good pieces to demagnetizing coil held above delivery hopper



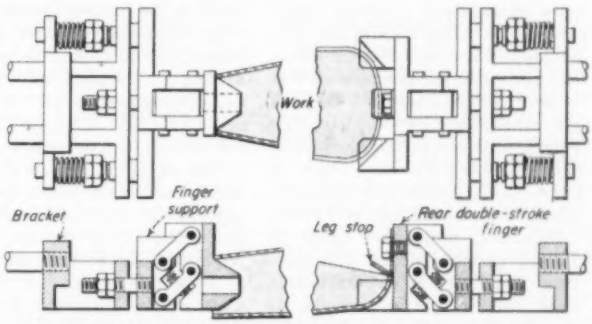
Automatic stack feed has suction cup lifts to raise developed flat blanks to level of transfer fingers. Loading tables replenish the feeder



Washing-machine legs are made automatically on a 250-ton Transmat press in the Maytag plant. Design of the feed fingers changes on some stations, because of the gradually changing shape of the part as it moves to the discharge end of the press



Adjustable-height feed fingers; are required at early and late work stations to suit part shape. Eccentric-shank bolts in feed box provide the adjustment



Double-stroke feed fingers are required at the two center positions. The assemblies must lift the washer-leg stampings as well as move them left one position. Extra inward movement is obtained by levers operating in cam tracks. Fingers are raised by double links

TRANSFER PRESSES HANDLE NON-CONCENTRIC WORK

BY JOHN VERSON
VERSON ALLSTEEL PRESS CO.

Engineering skill in devising suitable mechanisms continually broadens the kinds of work that many classes of machines can perform. And so it is with transfer presses.

Originally, transfer presses were capable of producing round shells, such as oil-filter bodies. A transfer mechanism with feed fingers moved the developing workpiece from station to station. But now, rectangular, square and non-concentric workpieces can be transferred automatically.

Non-concentric work is the most taxing on the skill of the machine designer. A washing-machine leg is a prime example. The Maytag Company is now using a 250-ton press measuring 108 in. between housings and with a 50-in. wide bolster to produce this part at the rate of 900 pc per hr. Downtime is avoided by having two loading tables at the automatic stack feed. These are automatically shifted successively to the feeding position, when the supply of blanks drops to a predetermined level. Blanks, and the workpiece, as it is developed, are transferred through the press by only two types of feed fingers.

WHAT PRICE EMPLOYEE MORALE?

A nationwide McGraw-Hill survey asked workers: "Is there any plant, to your knowledge, which you would prefer as a place to work . . . rather than the plant where you are now working?" Replies on 72% of the returns said "No." Does this indicate that labor is dissatisfied? Perhaps the popular "nickelmindedness" and fringe benefit demands are a means rather than a goal; one concrete way to express displeasure at "those little things"

BY A. M. ELLIOTT, LE ROY, NEW YORK

MORALE, as a subject of popular discussion, is not likely to replace the merits of the local bowling team, but many aspects of it do show up regularly in every "bull" session. Excluding the chronic complainers, there is left a considerable volume of worthwhile fact that is well worth analysis. Feelings are intangible, yet they are the very touchstone of our individual and collective success. There is scant chance that anyone will ever attach a unit measure to *morale*.

Industrial minds are tuned to dollars, pounds, inches, and minutes. The measurement and evaluation of industrial morale is probably the major stumbling block in the road to bettering employee relations. What is gained by spending $1000 for 100 employees at a company picnic? And what percentage, if any, of that expense should be expected to return to the company's pocket as improved relations?

Executives and laborers alike, most people are not consciously psychology minded, hence it is difficult to measure the return. Sometimes it is necessary to lay aside the "dollar yardstick" and think in terms of long-range effect. Psychology in plant activities differs little from the same stuff at home. Give your livingroom a new rug, or your wife a new coat, when things seem dull and you brighten the perspective of the entire family.

In the shop, the answer is the same. And it is not necessary that the encouragement always go directly to the workers' pocket. Some of it can benefit employer and employee, should in fact. A new coat of paint for the shop, color dynamics for the machines, improved ventilation, better lighting, a modern wash-room, or a couple of new machines, are a few of the many things that can brighten the entire outlook. However, unless complete modernization of the shop is intended, do not provide all of these at once, but just one or two at a time, or the boys will think that the company has money to burn. Also, if a definite irritant—person or condition—is causing the poor morale, remove it or improvement will be short-lived and the effort wasted.

Dollars and Sense

Remedial effort on management's part to certain aspects of industrial living will require the outlay of a few dollars, but the return, while literally immeasurable, might well be very surprising.

Despite what a labor front would have folks think, many plants scattered across the country have not only never approached strike talk with their unions, but had to request employees to create those unions in the first place. These are in addition to those plants where labor-management harmony is present without benefit of unions or employee associations.

Some of the earliest moves to improve labor conditions were started by forward-thinking American plant owners. Similarly, the popular conception of labor as thinking only in terms of "more money for less work," and that management can pay and pay is as wrong as the widespread misconception that there is no defence against an atom bomb. Both should be corrected; educated away. Both are created by sensationalists and people seeking personal gain or advantage. These selfishly weaken our national solidarity; cannot be tolerated when united strength is all-important.

Labor's "nickelmindedness" is about as prevalent a contention as it is untrue. Not that the worker would refuse a nickel more, nor that he does not wish it, but he can be and often is perfectly contented without it. Why all this bickering and squabbling—annual negotiation, walk-outs, slow-ups, and lost money on both sides? *Things*, as they are, make the worker unhappy. Those minor irritations which seem so trivial—unanswered suggestions or repeated requests through leadmen or stewards, "impossible" rules, discriminations, uncalled-for abuse, a multitude of minor resentments that resolve

themselves into one solid demand—five cents more to take the "guff." When such conditions persist, the self-seeking agitator has a wonderful time planting his seeds.

That nickel will not make the worker one iota happier; gains nothing for the "boss." For 500 employees, $1000 per 40 hr week, $52,000 in a year—spent unsuccessfully to alleviate a condition that a little applied psychology would cure with small cost. Management *can* eliminate a lot of "guff," thus make employees happier, avoid discontent, save thousands of dollars a year, and boost production, at very little expense.

Dissatisfaction is often expressed by "quits" who are perfectly content with the money but leave for jobs that pay the same, or less, money in other plants. Their attitude is simply that "life is too short" to put up with avoidable irritations. These people know that a nickel won't solve their problem. Lack of financial independence has kept their number few—but it is growing. Management would gain if more employees could honestly feel free to bring the true reason for their annoyance into the open.

Many managements insist that they have no interest in their employee's personal life. Little do they realize that, in many cases, it is the restrictions of this personal life that keeps the plant staffed at all, with any proportion of first-class labor—unless wages are well above the area average. If the latter form of bribery is necessary to hold help, the ice is very thin for skating. Unions display an interest in their members personal lives, why not management, as head of the plant family, an even more sincere interest—without prying?

Point of View

Successful labor - management relations, honestly approached, result from the realization by both sides that the conference table changes nothing but the point of view. Human frailties, demands, and ideals are as prevalent on one side as on the other. The profit motive is fundamentally no different at the wage-hour level than at the coupon clipping peak. It is the American birthright of democratic individual enterprise with equal rights to all. Amazing, isn't it, considering the volume of material published on "Man, the individual," how many executives are succeeding with a personnel policy reminiscent of pick-and-shovel gang days? And the American workman is the most independent in the world today; has the highest standard of living!

But, what are some of these petty irritations that cause so much trouble, are so costly? Perhaps a few questions will provide their own answers.

How Do You Rate?

Is that new worker treated with courtesy and dispatch from the moment of his arrival on the first day? Is he fully orientated on his job, the men around him, wash-room, locker, toilet, and cafeteria locations? Have all of the company rules been explained and the services which must work with him introduced? Or, is he told to report at 8 AM only to find that he must wait until 11 to be brusquely processed? Is he led to his machine and left, embarrassed and strange, to his own devices?

Are restrooms clean, neat, and sanitary; designed with consideration for personal feelings, properly maintained and well marked? Or, are there six commodes in a line across the floor of a dirty, dimly lit, draughty, hidden room—all exposed without any concern for mental or physical comfort—while the Superintendent has 25 sq ft of carefully appointed luxury beckoning when nature calls? Do the men get rated on daily production, or does a "snoopervisor" stroll regularly through the aforementioned hell-hole to see that all present are there with honest intent? Will the wash-room really accommodate 30 people in the 3 min permitted for wash-up? How long has that shower mixing-valve been out of order? In all fairness, it should be said that labor is largely responsible for the archaic condition of some washroom facilities. Deliberate destruction by thoughtless employees should not be tolerated. A committee selected by and from the workers can very often, with management's help, eliminate this condition; thus benefit everyone.

There are so many irritants that this list could go on endlessly. Most of management is aware of them without being conscious that they *are* detrimental to morale.

Constantly clanging call-signals —three times and off should be the rule.

Poor lighting, heating, ventilation, or a constantly unkempt shop are always sources of annoyance.

Antiquated "No Smoking" rules in areas where there are no hazards and no increased fire insurance premiums.

"No Sitting" policies dating to the days when only a visibly active man was working—may also cost production by increasing fatigue.

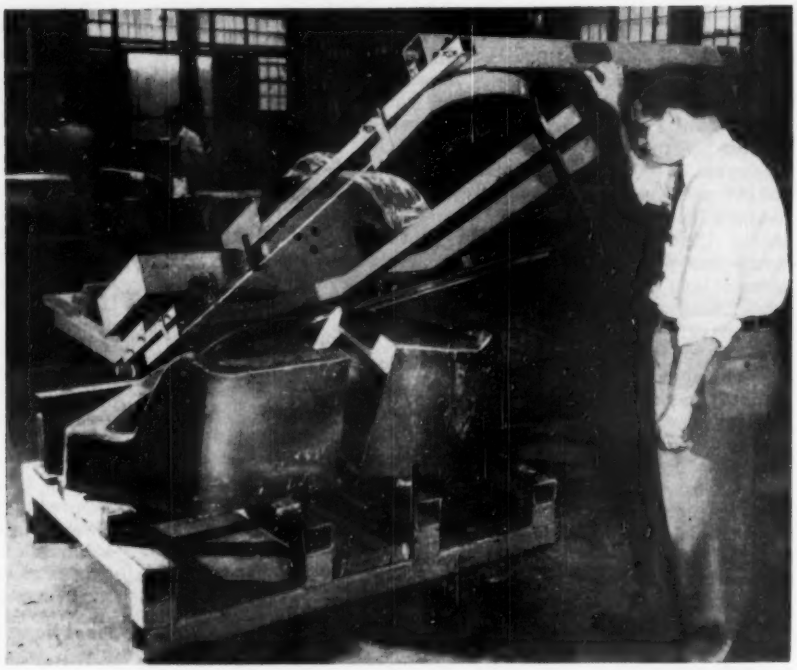
A parking lot blocks from the plant entrance—and jammed at quitting time so that 30 min are required to get out.

Cafeterias so small that employees must eat quickly and leave—provide no time or place for a pipe and relaxation.

Plant News Important

Then there is the company house organ. If properly used, this publication can do a tremendous job of bringing the plant family together. Some of the largest companies have learned to keep high pressure management propaganda out of it. The purpose of this periodical is the dissemination of news and views of the company's working family, a pat on the back here; an orchid there for a suggestion, award, good safety record, for high and low bowler. Pictures and accounts of outings, marriages, births, and deaths provide the real personal touch. Even the most insignificant, unassuming, and possibly, ignorant worker is given a feeling of *individual* prestige and recognition. And *never* display a piece of equipment or machinery without mentioning the operator by name.

A program of morale-building, in capable hands, may reap unexpected benefits in dollars and cents, as well as develop a feeling of well-being among employees instead of "make it worth my while" demands. This happier state of mind and sense of pride in a job well done is available to all in—Good Morale.



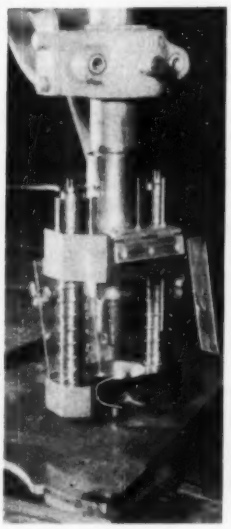
BANDSAW MOUNTED ON SKID DOES HEAVY CUTTING

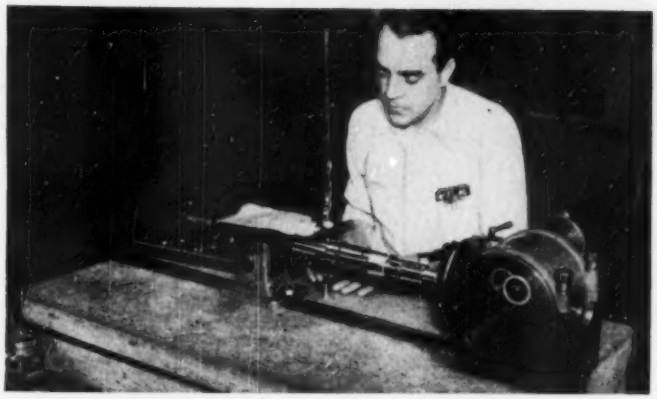
Obsolete drop-hammer dies are cut up before remelting in 55 min instead of former time of 4 to 6 hrs by shearing or burning. Blade is on a seesaw mount and is handled by one man. Skid base permits easy handling and movement anywhere in plant. *Glenn L. Martin*

TALENTED TOOLING

BUSHING ADAPTER WORKS ON SINGLE-SPINDLE DRILLPRESS

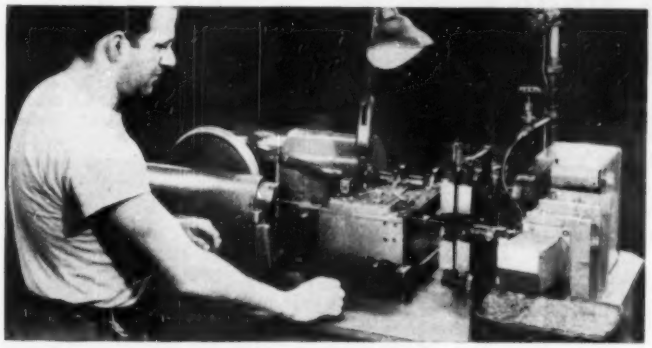
High-speed drills can be used up to the shank with an adapter that is counterbored to clear the chuck down to the bushing itself. Operation is conventional except that bushing in adapter holds down work as spindle is lowered. Air blows into counterbore, picks up chips, and blows out back, away from operator. *Glenn L. Martin*





DIVIDING HEAD BOLTS INTO SURFACE-PLATE SLOT

Gears and splines are precision-inspected between dividing head and bench center clamped in T-slot bar imbedded and bolted down in granite surface plate. T-bar is flush with surface, parallel to edges of plate. *Herman Stone Co.*



HIGH-SPEED MACHINE ROLLS SMALL METAL PINS

Radio-tube leads and other small pins are produced at 300 per min on special equipment that grooves, chamfers, and cuts off with through-feed tooling. Output is more economical for diameters from 0.040 to 0.070 in. and lengths from ¼ to 1½ in. *Sylvania Electric Prod.*

PREHEATING JIG CUTS WELDING TIME TO 1/3

Pressure plates for fuel tanks are located in jig where small, pierced gas tubes surround each of six fittings. Plate is produced in 45 min without cracks or checks—old method took 2¾ hr. *Lockheed Aircraft.*

ROUND TABLE

Head Beats Hands

"I see, Al, that Madison has taken that speed demon, Butters, off the crank levers and put Laziazell on in his place. I've heard of some crazy stunts in my time, but that one takes the cake."

"You worried, Ed, that somebody else's production will fall off?"

"Well, you know as well as I do that Butters can't be beat for action. To think of replacing him with another guy who we know is so damn lazy that only constant watching will prevent him from falling asleep on the job! I give up."

"You know I had a talk with Madison just about an hour ago, and we were discussing the same thing; I thought he was nuts too until he let me in on his secret."

"Secret!" blew up Ed. "I can't see any secret about doing something that shows a lack of brains."

"There's more brain there than you give Madison credit for, Ed," replied Al. "Ever stop to think that his big idea was to gain by a lazy man's efforts to get out of work?"

"Now you're going haywire! Ye gods, no wonder the world's going off its axis."

"Not as bad as you may think, Ed—ever stop to think that Laziazell might pull a fast one on that job and disclose some stunt that we conservatives may overlook?"

"You mean that he might quit the job when he finds he has to meet a schedule!"

"For your information, Pal, the lad has already pulled one out of the hat—yes sir, that boy has opened our eyes."

"I *thought* that both of you — Madison and yourself — were asleep all the time — and crazy to boot!"

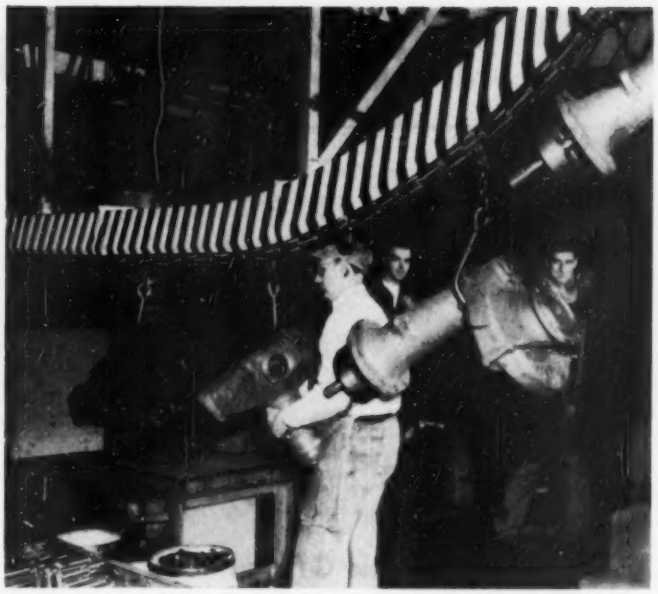
"No kidding, Ed, that lazy guy has really disclosed some gray matter. Do you know what's happening?"

"What? Don't try to tell me that he is turning out more work!"

"More work without as much effort," replied Al with a victorious smile. "Now crawl back in your shell and sweat that one over. Madison put a lazy man on a hard job—and a lazy guy will work like hell to make a job easier. He figures it's easier to use his head than his hands."

***IS LAZINESS** always a sin? Can effective handling get a lazy man to produce? Your ideas and opinions on this subject will interest others. Discussions of earlier topics appear on later pages.*

Pushbutton station at each of 6 dips permits starting or stopping conveyor. Lock-out slide at stop button permits controlled conveyor shut-down when necessary for safety reasons. Operation of stop button causes indicator lamp to burn at foreman's desk near final assembly line



Overhead chain conveyor delivers major parts for Type WD tractors to final assembly line. Conveyor is guarded by protective screen, except at dips where cover surrounds chain and trollies. Fully loaded conveyor holds 37 tons

Indicator lights show which station is responsible for stoppage of conveyor. When conveyor is not started soon after shutdown, foreman of assembly line quickly can check station to determine cause of stoppage

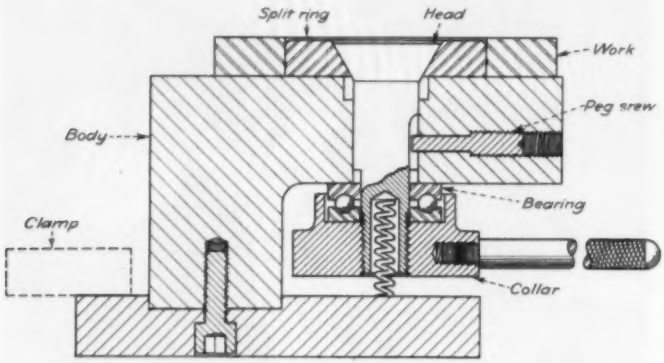
PARTS CONVEYOR CUTS PLANT CONGESTION

BY FRED R. WORLEY, Works Manager, West Allis Works
Tractor Division, Allis-Chalmers Manufacturing Company

ONE of the recent material-handling improvements effected at the West Allis Works of the Tractor Division included the installation of a 1452-ft overhead chain conveyor arranged for delivering front supports, clutch housings, hydraulic pumps, torque tubes, and final drive assemblies from the machining departments and subassembly benches to the final assembly line. This conveyor has reduced to a minimum the trucking of parts through the shop, reduced or eliminated many previous accident hazards, provided an overhead storage area for a bank of finished parts, and materially reduced congestion in the plant.

A feature of the installation is the indicator light panel that shows which of the six stations on the line is responsible for any stoppage of the conveyor. By phoning, or making a personal visit, the foreman can determine quickly why the line has been stopped and what corrective measures are necessary. This feature has been especially helpful in maintaining high production levels in recent months.

Practical Ideas



Expanding Chuck Grips Thin Aluminum Rings

LARGE BATCHES of thin aluminum ring components are handled for a face-milling job in this simple expanding chuck. The chuck is easy to make, easy to adjust for different work (by changing the split ring), and holds the rings firmly to prevent distortion during machining.

An L-shaped steel block is machined to form the body of the chuck, and is attached with a couple of bolts to the baseplate. The base can be clamped down on a milling-machine table, shaper table, or can be bolted to a lathe faceplate.

Rings are placed against the top surface of the body, which must be machined accurately to flatness, and are gripped by a split ring that expands as the conical head is withdrawn into the hole. The mechanism that operates the head consists of a collar that is threaded to the shank end of the conical head. Turning the handle on the collar withdraws the head, thus forcing the split halves of the ring out.

Inside a bored hole in the end of the head shaft is a compression spring, which makes the head jump out as soon as the handle is turned to release the work. A thrust ball bearing is mounted between the collar and the shoulder of the body to insure that releasing the collar will be easy, no matter how tight it is turned.

As for materials; the body can be mild steel, the head shaft should be cast steel which is hardened and ground, the collar can be mild steel, and the split ring should be cast steel. The ring is turned to about 0.005 in. under the ID of the work to be held in the fixture.

To prevent the head from turning as the collar is turned, a peg screw is fitted in through the side of the body to key in a slot down the head shaft. The body is recessed at the top of the bore to allow clearance for the shoulder on the head.

If desired, a number of holes can be drilled around the circumference of the collar so the handle can be inserted at various points. This is so the handle can be used without running into interference from clamping straps and the sides of the fixture. Normally, however, the handle will have to be turned through a small angle to clamp and unclamp the rings. *W. M. Halliday, Southport, England.*

Iron Cement and Bolts Seal Weak Casting

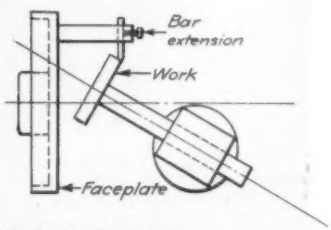
ABOUT SIX MONTHS AGO we had to increase the capacity of a small hydraulic press by installing a new cylinder with a 10-in. diameter instead of the old 5½-in. cylinder. We made patterns, and sent them out to a contract shop.

When we received the casting, we found that the spot where the gate had been ground off was porous. As the cylinder was bored, shrink holes appeared.

We finished the machining work and assembled the press, but found that with only test pressure of 80 psi, dust and air blew out of the weak spot, which was the size of an egg.

To remedy the condition, we drilled four holes about 1 in. deep in the weak area, and tapped for ⅜-by-24 bolts. The holes were filled with iron cement mixed slightly thin, and then the bolts were screwed in tight. We pounded the heads of the bolts, then tightened up again. After the process was repeated about 10 times, the bolts were tightened down finally and the heads were sawed off.

After two days—to allow the cement to harden and set, the press was assembled again. It has now been operating at 750 psi ever since, and no oil has leaked through. *C. A. Gilson, Stuart, Fla.*



Engine-Lathe Setup Turns Accurate Ellipse

A TRUE ELLIPSE can be accurately turned on an engine lathe with very little setup work. After the

blank has been roughed out by any convenient means, it is mounted on a mandrel that is attached to the compound rest.

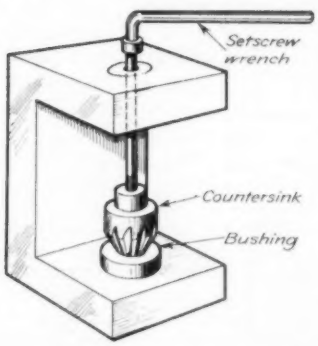
A toolbit is attached to the faceplate. The tool is adjusted to make a cut of the same diameter as the major axis of the ellipse. Both carriage and cross-slide are locked in position after they have been located, and all feeding is done with the compound rest. The setup must be made so there is sufficient clearance between the tool and the work all during the feeding motion.

The angle of the compound rest can be calculated by dividing the minor axis by the major axis. This gives the cosine of the angle between the centerline of the lathe and the centerline of the mandrel to which the work is located. *H. R. Gilliam, Lancaster, Ohio.*

Special Countersink Burrs Hidden Edges

TO DEBURR the inside edges of two bushings that were inserted in a U-shaped piece, we had to make a special tool from a countersink.

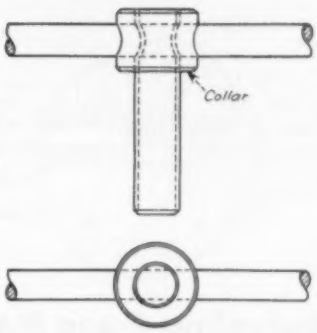
The regular countersink was cut off at the back to about ¼ in. shorter than the U opening. A hole was centerdrilled, drilled, and tapped into the rear face of the countersink, and a socket-head setscrew was inserted and jammed. After this, the countersink could be placed inside the U-shaped opening and centered in the bushing. A long hex wrench was inserted through the opposite bushing. *Robert Long, Newark, N. J.*



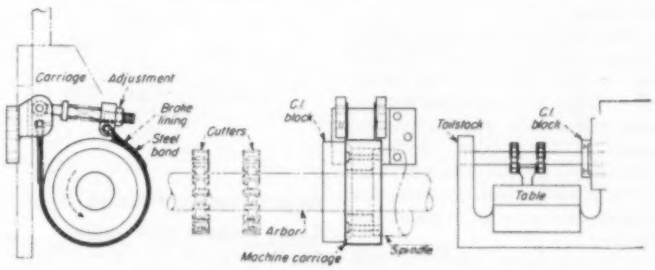
Large T-Handle Has Threaded Collar

LARGE-DIAMETER HANDLES can be assembled to relatively small-diameter screws for jigs and fixtures if a threaded collar is employed. Most such T-handles are made by drilling a hole through the screw, then inserting a round piece of stock. On small screws, the stock might be too small in diameter to provide a comfortable grip, but if a threaded collar is added, a larger rod can be employed.

The collar is drilled and tapped to fit the screw, and is assembled on one end of the screw. Then a hole for the handle is drilled through both collar and screw together. The handle can be as large as the screw if a threaded collar is employed. It is important, however, that the centerlines of both holes drilled through the collar cross each other.



At one point on each side of the screw it may be drilled completely through, but the threaded collar holds the two ends of the screw together. Thrust is taken by the collar's threads, and torque is taken by the bottom half of the drilled surface of the screw. *R. B. Wolverhampton, Fallings Park, England.*



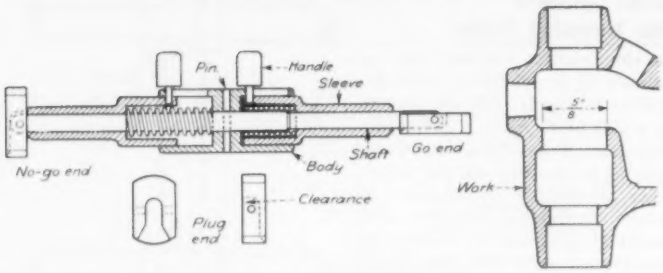
Torque Brake Cuts Chatter On Old Boring Mill

WHEN STRADDLE-MILLING thin welded sections on an old boring machine in our shop, we found that excessive vibrations were set up. They were threatening to break down the gearing in the drive mechanism. Even though we offset the teeth on the cutter, the chatter did not stop, and we were ready to switch the job to another machine when we thought of trying a brake. We figured we could steady the arbor this way.

A cast-iron brake block was made and keyed to the spindle, which operated a boring bar equipped with two cutters. The boring bar was supported at the outboard end in a tailstock.

The brake band was made of strip steel, lined with regular auto brake lining. This was fastened to the upright carriage of the machine, and was wrapped around the brake block. A screw, spring, and nut permit adjustment of brake tension, which controls braking power.

Results of the addition to the boring machine were elimination of chatter—and a finer finish on the work—and little increase in power consumption. *H. G. Frommer, Milwaukee, Wis.*



Swiveling Gage Members Get into Hidden Bores

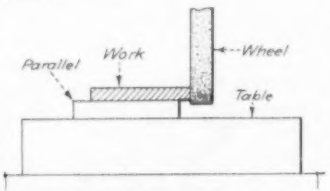
TO CHECK a ⅝-in. bore in a valve body where the bore was 3/16 in. larger than the hole opening into it, we had to have some kind of expanding gage. The problem was submitted to a number of gage makers, but the amount of expansion was too great for conventional gages. The design we adopted is illustrated.

Two plug ends are made flat on the sides so they will pass through the smaller hole into the larger one. These are mounted one at each end of the gage body, and were cut from disks. Sufficient clearance is ground into each plug so they will swivel on their supporting shafts to go straight into the hole.

A round sleeve acts as a gage body. This is pinned to the central shaft, to which both plugs are pinned. Two smaller sleeves, working inside the body and outside the shaft, are controlled by pins through slots in the body which are fitted with small handles. As the gage is pushed into the valve body past the smaller hole, the handle for that end of the gage is pushed forward. The small end of the sleeve catches the edge of the plug, which is cut at a spreading taper, and swivels the plug to a position at right angles to the shaft. Then it is in position to gage.

The swiveling motion is aided by two compression springs mounted inside the main body where they will act on the two sleeves.

One plug is for "go," and the other is for "no go." Although the plugs would not work in plain, through holes because their edges are not rounded to the same radius in both directions, there are side holes running into the hole to be gaged, and both plugs will open when they are aligned with the side holes. *L. O. Blackstone, Mansfield, O.*



Edge Grinding Finishes Cams Smooth and Square

AFTER MAKING up a set of cams from a master templet, which was furnished to us by the customer, we had to finish the edges perfectly square and highly polished. The rough work had been done by sawing and filing, so there were plenty of file marks. Even though the outlines were accurate, the edges were slightly slanted.

First we dressed the side of a surface-grinder wheel exactly straight up and down, then located each cam on a pair of parallels on the magnetic table of the grinder. Each cam was hand-held lightly against the side of the grinding wheel and was rotated slowly. All of the edges were ground in this way.

The finish provided was good, and the edges came out square. *Joseph J. Sanzo, Ilion, N. Y.*

Tap Extension Holds Tight

WHEN IT IS NECESSARY to make an extension for a tap, an easy and simple way is to drill the extension rod to take the shank of the tap in a slip fit. This hole is drilled about ½ in. deep.

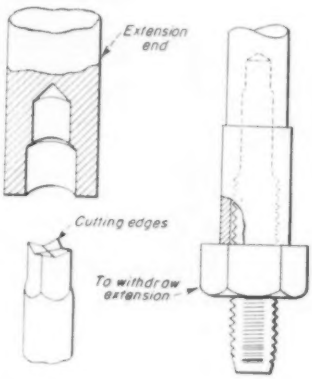
Next a drill of the same diameter as the distance across flats of the square end of the tap is selected. This drill may be as much as ten thousandths oversize. A second hole is drilled in the bottom of the first with the smaller drill.

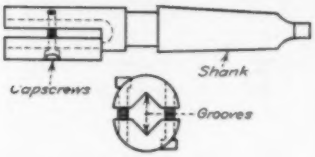
Finally, the tap itself is altered slightly. The square end is ground off to the shape illustrated so each corner has a slight rake angle on it. The smaller drilled hole must be a little longer than the length of the flats on the tap.

Now the tap is pressed into the extension with a vise. For this purpose, it is best to hold the working end of the tap in a piece that has a blind hole drilled in it.

As the tap presses into the hole, the cutting edges on the four corners will cut grooves and will curl the chips down into the hole. The fit will be tight so the tap cannot drop out, and the grooves will prevent the tap from turning in the extension.

To remove the extension a piece of pipe is dropped over the tap to bear against the shoulder on the extension, and a nut is threaded onto the tap. Turning the nut will force the extension off. *Gordon Allen, Amite, La.*





Tapholder Has One Moving Jaw

I READ Dan Penway's item on a spider tapholder (*AM* July 24 '50, p143) with considerable interest. We have a similar tapholder in our shop which is somewhat simpler.

When setting up a job, it seems to me that four independent clamping screws make it difficult to prevent eccentricity. Of course only one or two need be loosened to remove and replace the tap, but our holder has only two jaws to start with, so setup is easier.

The holder is a piece of bar stock with a taper ground on the shank end and with the other end machined out carefully to V-groove. Two holes drilled and tapped through the grooved end permits assembling a V-grooved insert with capscrews.

This tapholder will take only one size of tap—that for which the V-grooves are cut—while Mr. Penway's holder can be adjusted. However, operation of this design is much faster during setup.

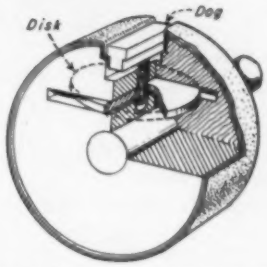
To insure accuracy, tap shanks are ground down slightly smaller than they originally are received to make sure the shank is concentric and round. *Frank M. Butrick, Jr., Alma, Mich.*

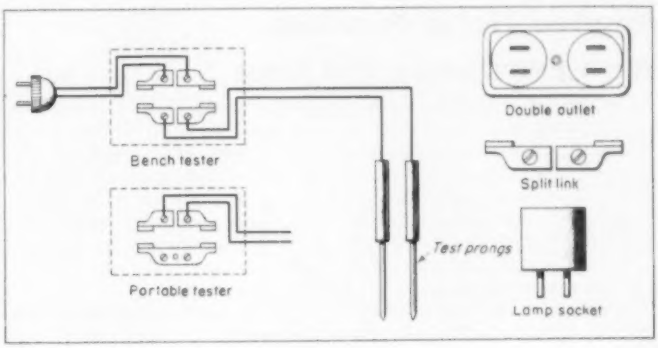
Small Polishing Wheel Clamped With Dog

OLD-STYLE POLISHING WHEELS have wedges that grip the two ends of a strip of emery cloth in a cross slot. Although there is nothing wrong with the method of clamping itself, the wedge can become loose and might be dangerous. Here is a way to adapt such a wheel for positive clamping.

The 3-in. wheel is 1½ in. wide, and is made from Dural. Felt is glued down on the outer surface to provide a degree of resiliency. After the slot is milled out, a hole is drilled and tapped down through it into the wheel, and a second slot is cut through the wheel at right angles to the hole.

Clamping is done with a milled dog that has a shoulder which hits a shoulder in the cross-slot. The dog is fitted with a stud, which is threaded into the hole and through a knurled disk that fits in the second slot. Thus, the emery cloth can be wrapped around the wheel, the ends pushed under the dog, and the dog tightened down by turning the disk—which projects from the sides of the wheel. Centrifugal force cannot loosen this arrangement. *E. F. Wallendorf, Lynbrook, N. Y.*





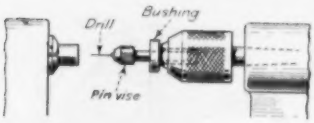
Two Electric-Circuit Testers Prevent Shock Hazard

AFTER I SAW a maintenance man get a 220-volt ac jolt while using a home-made circuit tester with exposed connections, I decided to do something constructive about it. These two testers—one for bench work, and one for machine work—are the result.

The bench tester is made with a double receptacle—the type that can be screwed against a baseboard in a house to provide two outlets. Both metal connecting links are cut in half, and the cut ends are filed away to provide at least 1/16-in. clearance when they are reassembled. Wiring is done so current from a 220-volt source will have to go through two 110-volt bulbs, one in each side of the line. Two pronged bulb sockets are inserted in the receptable, and two small bulbs are inserted.

The portable tester is made from a similar receptacle, but only one connecting link is cut in half. Two bulb sockets and two bulbs are added after the wiring has been done as illustrated.

The difference between the testers is that the portable one uses current from the machine being tested, while the bench unit has its own power source at a wall plug. Both units are fitted with insulated test prongs. Because all connections are covered up, the danger of shock is greatly reduced and operation is simplified. *Fred Lettino, Astoria, L. I.*



Pin Vise in Tailstock Drills Tiny Holes

FOR SENSITIVE CONTROL of a drilling operation, where the drill might be as small as 0.013 in., a setup can be made on an engine lathe with a pin vise holding the drill.

A small drillpress chuck is first inserted in the tailstock in place of the regular center. Then a drill bushing is made to fit the round shank of a pin vise, and is hardened. The drill is chucked in the pin vise, and the vise is mounted in the bushing.

Work is chucked in a collet in the headstock, and drilling is done by advancing and holding the pin vise by hand. With such a small drill, stock removal is slow and the drill can be easily kept from twisting.

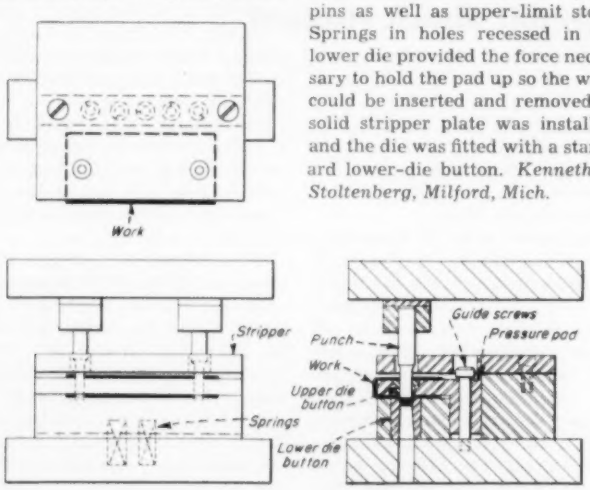
If the shank of the pin vise is a close sliding fit in the bushing, the drill will be easy to feed and will be guided accurately. *Bernard D. Campbell, Endicott, N. Y.*

Aligned Holes Punched With Previously Cut Slug

PARTS that are to be punched, then formed so the punched holes line up exactly, are difficult to produce accurately. For a batch of channel sections made from sheet metal, we decided to switch the usual order and bend first, then punch. This made a special die set necessary, but it increased precision.

After the channel was formed in each piece, the work was inserted in the press around a spring pad with a button die in it. The punch came down, depressing the pad and cutting through the first wall of the stock. Then the first slug was carried along with the punch to hit the lower wall and cut through, making the two holes exactly in line. After the punch raised, the spring forced the pad up again to clear the work and allow it to be withdrawn.

The die was conventional except for the pressure pad, which was supported from the lower die and at the rear. Two shoulder screws held it down and acted as guide pins as well as upper-limit stops. Springs in holes recessed in the lower die provided the force necessary to hold the pad up so the work could be inserted and removed. A solid stripper plate was installed, and the die was fitted with a standard lower-die button. *Kenneth L. Stoltenberg, Milford, Mich.*



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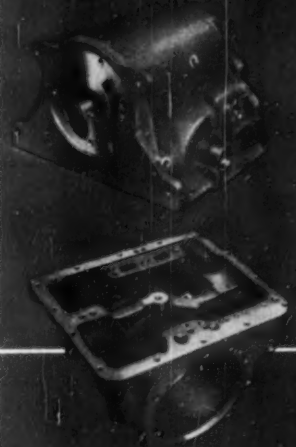

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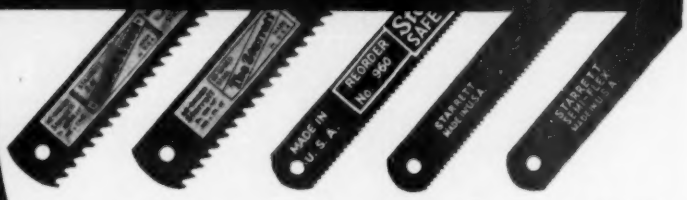

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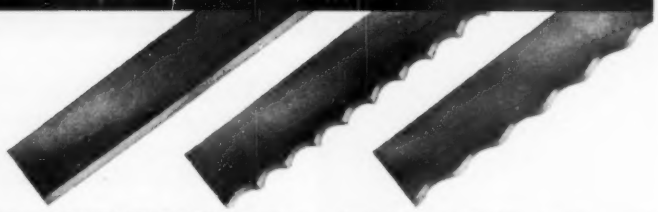

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American Machinist REFERENCE BOOK SHEET

Resistance Welding Applications...I

BY R. T. GILLETTE Works Laboratory, GENERAL ELECTRIC CO.

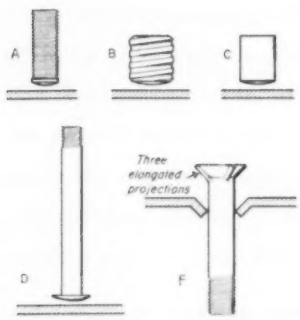
RESISTANCE-WELDING equipment produces significant economies in fabrication of many diverse articles in both production plants and job shops. Notes are given on how to design parts for the various welding processes, plus data on some little-known applications.

Spot and seam welders, besides their normal uses, are employed for spot and line annealing, for post-weld heat treatment of welded joints to match the qualities of the original material, and to harden localized areas. Butt welders may be used to anneal sections of a rod or tube or to heat sections for straightening or bending.

In the examples that follow, reference should be made to the following sources for edge-overlap distance and welding procedures: (1) "Recommended Practices for Resistance Welding", and (2) the Welding Handbook, both published by the American Welding Society.

Projection Welding

STUDS AND SCREWS



SMALL, SHORT studs *A* are projection-welded to sheet-metal structures for attachment of brackets, instruments, knobs, hinges, nameplates, etc. Heavy stud *B* with coarse-pitch, round-bottomed thread serves as a spring seat or retainer. Heavy, plain stud *C* is employed for parts that must turn or be adjustable for several positions. Thin-head screws *D* are projection welded to cabinets for fastening racks or thermal insulation. Flat-head screws *F*, without a screw slot, and having three elongated projections under the head, can be projection welded flush with thin panels having pierced and dimpled holes. This type of welding screw works well on 0.010- to 0.1251-in. sheet, and is easily produced on a header

TRUNNION

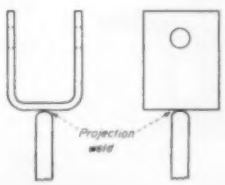
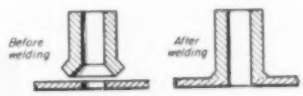


PLATE AND ROD in thicknesses and diameters up to ½ in. can be assembled to form trunnions and universal joints. Projection welding is a cheap, fast process of manufacture in such cases

BALLS

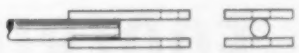
A BALL produces ideal projection-welding conditions and may be welded readily to one or both ends of a stud or bar, likewise to sheet and plate. Typical application: a ball-valve assembly

NIPPLES

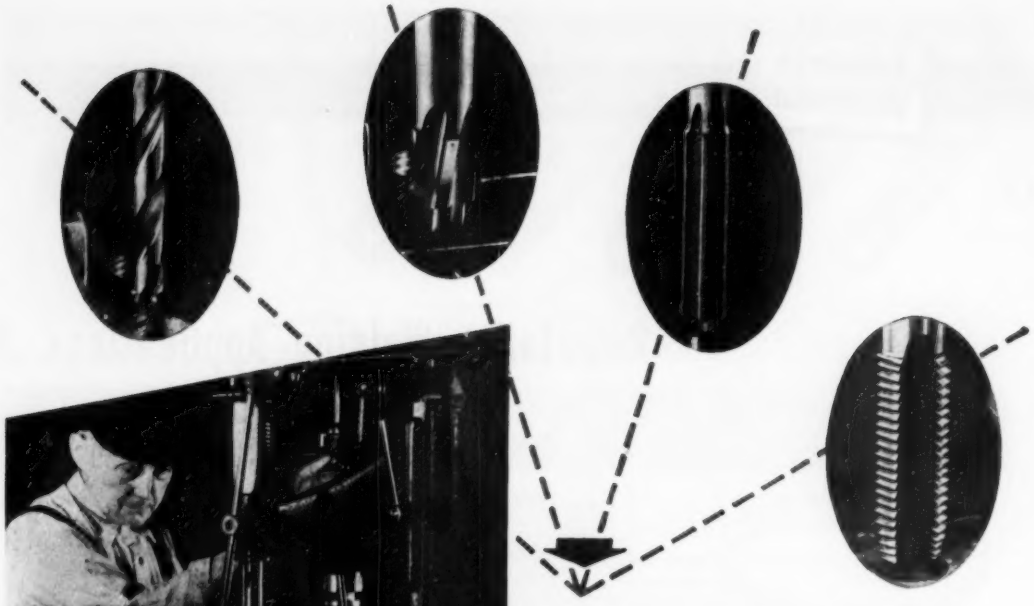


NO CREVICES or openings are permissible in the joint, when nipples or tubes are welded to a structure that is later vitreous enameled. Such defects trap air bubbles to cause holes or defective spots in the finish. By flaring the nipple as shown, a smooth joint and a sound weld are produced

CLEVIS

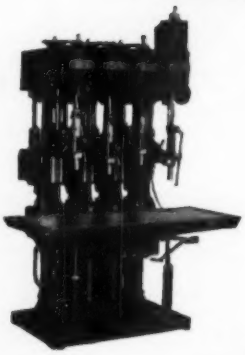


TWO PIECES of strip stock can be projection-welded to opposite sides of a round rod in one operation



a full range sensitive drill for Production operations

● For continuous operation Footburt Sensitives have the sturdiness to maintain trouble-free accuracy on long runs. High speeds up to 3450 RPM for small drills on brass and aluminum work, and slow speeds down to 185 RPM for counterboring in tool steels are both available. Power feed and built-in tapping attachments may be added for highest production. Write for full particulars on this full range drilling machine.



4 spindle machine with tapping attachment and power feed attachment.

THE FOOTE-BURT COMPANY · Cleveland 8, Ohio
Detroit Office: General Motors Building

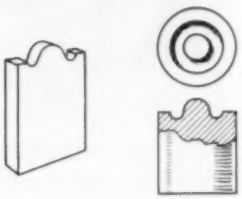
●

FOOTBURT *Sensitive* DRILLING MACHINES

a Time Tested line of machine tools

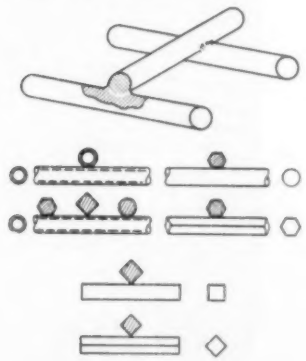
Resistance Welding Applications...II

FLASH-FREE ASSEMBLIES



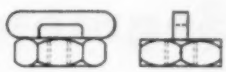
IT IS OFTEN necessary to projection weld a rod or bar to sheet or plate in such fashion that close contact is obtained between the two, but no upset or flash is permissible. This is accomplished by the center projection which forms the weld and a surrounding undercut of equal or slightly greater volume to accommodate metal displaced by the forging or upsetting action

CROSS-WIRE WELDING



CROSS-WIRE welding is the most simple form of projection welding, because the crossed-wires form natural projections. Wire, rod and tubing of almost any cross-section can be welded to itself or to nearly any other shape. By using proper equipment and control, including slope control, nearly all of the non-ferrous metals may be joined in like or dissimilar combinations, and many combinations of ferrous and non-ferrous materials are weldable by the method

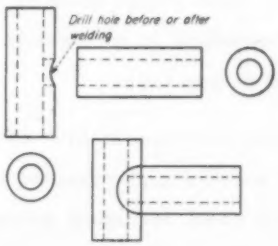
WING NUTS



SHEET STOCK from 0.035 to 0.125 in. may be punched to form wings of the desired size and shape and then edge welded to common nuts, using a slotted or clamping welding fixture or electrode

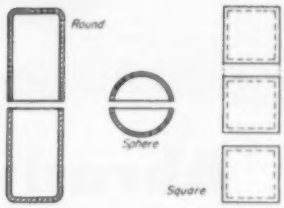
Flash Welding

T-WELDS



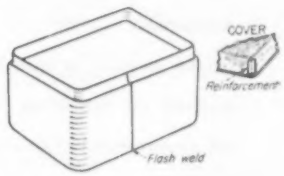
TUBING, solid rod and plates may be flash welded for T-shaped connections. The end of long arm of the T is cut square. During flashing, the parts will flash to a fit. If plate stock is properly welded, a fillet will be formed at the joint. In the case of tubing, the hole in one part may be drilled before welding, but a cleaner hole will result if drilled after welding, assuming the long arm of the T is short enough

FLOATS



CONTAINERS or floats of any size up to 3½ in. dia (depending on material thickness) may be made by drawing two halves, trimming the edges square and flash welding them together. Mounting or operating brackets may be spot or projection-welded to either or both halves before they are flash-welded

BOXES



A SINGLE SET of tools will suffice to make a complete line of boxes. First, blank the side of the box from strip. Form the cover ledge and a bottom flange. Bend the corners in a brake. Flash weld the ends, spot weld a bottom in place.

To produce the cover, blank with four corner notches, form the sides on a brake. Then in a die common to all sizes of corners, bring the edges together. The metal is caused to flow or be drawn together, and is thinned. So weld in a reinforcement at the back of the seam and finish the outside surface on a disk grinder. This practice produces a cover that is entirely adequate for many purposes and is much cheaper than if made by other methods

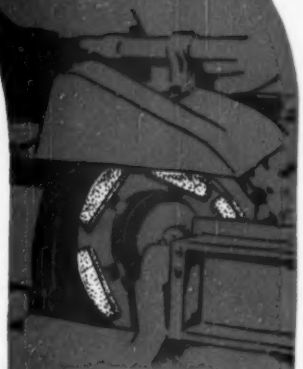
SIMONDS ABRASIVE CO.

Abrasive Segments

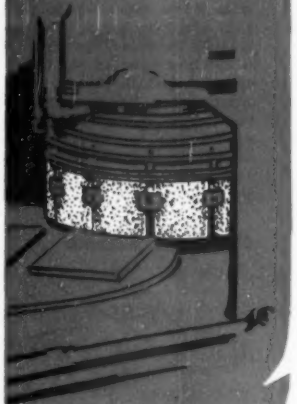
for speed and savings in grinding

Use Simonds Abrasive Company Segments . . . economical . . . fast . . . cool cutting . . . for surfacing large areas, a number of small pieces chucked together or machine knife grinding. In all sizes to fit all segmental chucks, solid or gap type.

Simonds Abrasive Company's complete line offers everything you need for vertical or horizontal surfacing . . . everything you need, including Straight Wheels, Cup Wheels, Disc Wheels, Cylinder or Ring Wheels, for all your grinding jobs. For information on abrasive segments, write for Bulletin ESA 188.



MACHINE KNIFE GRINDING



VERTICAL SURFACE GRINDING

GRINDING WHEEL INSTITUTE MEMBER

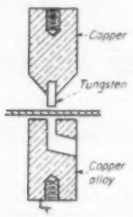
SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA., DISTRIBUTORS IN PRINCIPAL CITIES

DIVISION OF SIMONDS SAW AND STEEL CO., FITCHBURG, MASS. OTHER SIMONDS COMPANIES: SIMONDS STEEL MILLS, LOCKPORT, N. Y., SIMONDS CANADA SAW CO., LTD., MONTREAL, QUE. AND SIMONDS CANADA ABRASIVE CO., LTD., ARVIDA, QUE.

Resistance Welding Applications...III

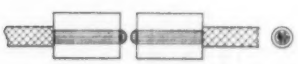
Upsetting and Burning

HOLES IN HARD MATERIALS



HOLES may be burned through hard metals up to 0.090 in. thick by spot-welding electrodes consisting of a tungsten punch and a copper alloy die (RWMA alloy, group A, class 3). When the punch gently contacts the material, current is applied and the hole is burned out. Current is turned off as soon as the punch penetrates the material to avoid burning away the edges of the hole. This method is used for materials impossible or difficult to machine, and where they would be cracked or the edges of the hole shattered by punching

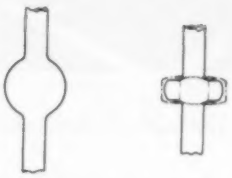
FUSING AND POINTING



STRANDED cable may be burned off and the ends fused to prevent untwisting, using a butt welder. The cable is clamped with sufficient material length between dies, current is applied without pressure or motion. Any insulation must be stripped first. Ferrous and non-ferrous cables can be burned off, including those with copper or aluminum cores.

Solid rods are burned off and the ends pointed by a modification of this process. The material is clamped, current brings the stock to forging temperature, the clamps are slowly moved apart, and points are drawn on each end

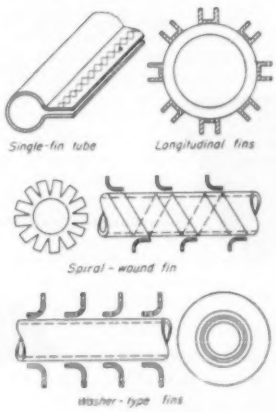
COLLARS OR FLANGES



A HEAD, collar or flange can be formed on a long rod by means of a butt welder. The bar of any standard shape is held in the machine with sufficient material between the clamps to form the upset. Current and pressure are applied and the upset is produced

Seam Welding

FINNED TUBING



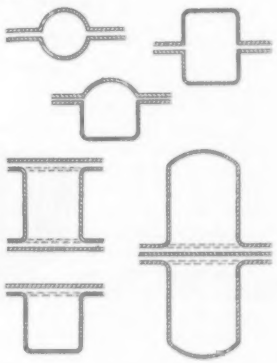
HEAT-TRANSFER tubing is economically produced by seam welding. Any reasonable length of single-fin tubing can be produced. Make the weld close to the tube or trim the fin to the edge of the weld, in order to minimize fin width. For proper flange width refer to reference 1 or 2

To make spiral-wound finned tubing, the fin may be slit or formed with a solid flange. Wall thickness of the tubing must be great enough to withstand welding pressure. In most cases, one welding wheel contacts the fin and the other the tubing directly opposite. Accurate fixtures are required to form the fin and guide it and the tube through the machine

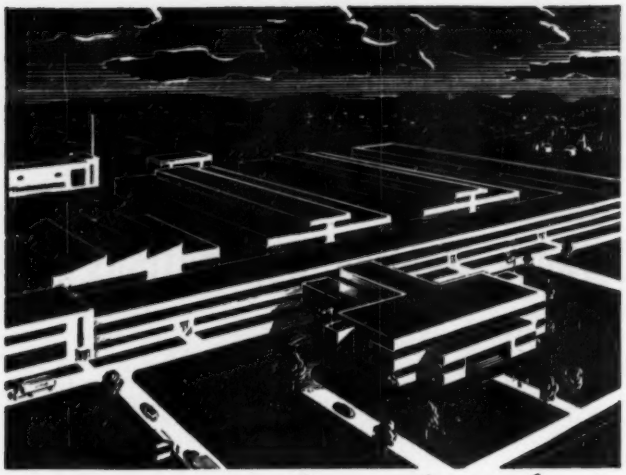
Flanged washers, forced over the tube, are seam welded by contact wheels on opposite sides. Two welds are made in series so that one-half revolution of the tube completes the weld

If longitudinal fins are required, an even number must be specified. Two fins on opposite sides of the tube are welded in series at one time

CONTAINERS



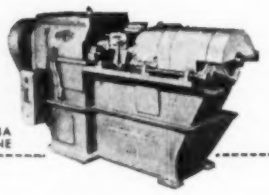
MANY SIZES and shapes of containers have been seam welded pressure-tight to gases or liquids, using drawn or spun parts of most ferrous and non-ferrous alloys. A two-compartment vessel is produced by placing a plate between the flanges of two drawn shapes and seam-welding. Baffles may also be seam or spot welded into one or both halves of a tank prior to joining the two main parts. Container size is limited only by the equipment available and the material thickness. Gages may range from 0.010 to 0.187 in.



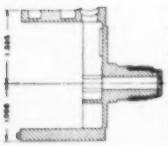
Keenly competitive modern plants have set a single standard for machine tool investments— cost-per-piece— plus sustained machine efficiency.

The reason for insistence on this scientific approach is obvious: the *right* machine pays for itself and begins producing sustained profit in a matter of months, weeks, even days.

New Britain Automatics are designed and built with *sustained low cost-per-piece* as the first consideration.



NEW BRITAIN MODEL 23A AUTOMATIC CHUCKING MACHINE



A New Britain Model 23-A four spindle tool rotating chucking machine turns out the part sketched, which is made from zinc alloy SAE Specification 903. Ten operations are performed, including turning, facing, chamfering, grooving and threading. In turning the outside diameter for threading, concentricity with the previously finished inside diameter is assured by the use of a pilot tool. 742 pieces are completed hourly — one every 4.8 seconds.

NEW BRITAIN

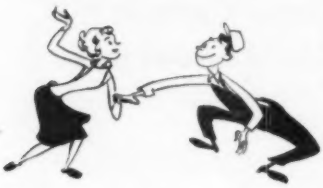
Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

650HFI

MULTIPLE SPINDLE AUTOMATIC SCREW AND CHUCKING MACHINES • SINGLE AND DOUBLE END PRECISION STRAIGHT AND CONTOUR BORING MACHINES • LUCAS PRECISION HORIZONTAL BORING, DRILLING AND MILLING MACHINES

TALKING SHOP



Canteen Relations

OVER at the Westinghouse Lamp Division in Bloomfield, N. J., they are trying something new in community relations. On alternate Friday nights the recreation room becomes a "Teen Canteen", with soft drinks served in the cafeteria. If the plant survives the teen agers' jitterbugging long enough, they might grow into loyal employees and it's already making friendly neighbors of their parents.

Concentrated Control

QUALITY CONTROL by statistical methods has been widely discussed and widely used in recent years. Perhaps one reason is the more-or-less-annual course given by the University of Iowa. In announcing the course this fall, Lloyd Knowler tells us that previous graduates have applied the principles learned not only to mass production (naturally) but also to plants having 6 or 7 employees and producing less than 40 items per day. Maybe, like us, you thought of quantity control as a tool for quantity production. If so, maybe there's something in this concentrated 10-day course for all of us.

Dollar Shortage

AMERICANS are essentially practical —or commercial—researchers. We direct most of our research energies toward results that can be built into new products. Basic research has seemed to be largely a European product. Even much of the research in universities is of the commercial type, for the simple reason that declining bequests, shrinking endowments, and increasing costs have created a dollar shortage there, too. We need, as a nation, much more basic research—but neither industry nor education can pay for it today.

Even so an Engineering Bulletin from Purdue University which crossed our desk the other day reminded us to point out that a lot of basic research data is available to anyone who has a legitimate use for it. This particular booklet listed, among others, studies being made on corrosion of steel and alloys, high-temperature stress and rupture of tubing, radiation in combustion chambers, and reverse-cycle refrigeration. Other colleges have similar very valuable—and relatively unpublicized—basic research data available.

University studies, usually made under ideal conditions, can be backed with moderate expense by any interested manufacturer, who can choose his own field for research. In addition, much data obtained by graduate students is available to anyone who can use it. The only thing to watch for is patent rights—because universities too, have learned that a patent can bring royalty or cash payment that provides money for further research.

Phosphor Plating

PHYSICISTS at the U. S. Bureau of Standards report a new series of shining, rust-resistant, hard-metal alloys as plating materials. Phosphorus, combined with cobalt or nickel, produces alloys more easily deposited than chrome, hard and wear-resistant, yet decorative and simpler to plate than chrome. Appearance of the alloys depends on phosphorus content. Less than 2% gives a smooth, matte surface; as the phosphorus percentage goes up, the brightness increases until the surface becomes nearly as lustrous as the most shining nickel. Some of the alloys, if immersed momentarily in an oxidizing solution, acquire a jet-black film which is hard, adherent, and offers good decorative possibilities.

The Bureau is also working currently on magnesium alloys, determining strengths and rust resistance. These properties differ with atmospheric humidity and with many other factors.

Giant Shock Absorber

YOU'VE a real job on your hands when you have to turn over large rectangular castings and forgings weighing as much as 150 tons. Erie Foundry Co. often faces this problem in machining parallel surfaces on anvil blocks for its forging hammers. So, company engineers have devised a roll-over pit that is 15 ft square by 8 ft deep and is filled flush to the floor with cast-iron chips and cuttings. Castings and forgings are tilted at the edge of the pit and, as they go beyond their center of gravity, are permitted to fall free onto the pit material. The chips absorb all shock and the danger of pulling the crane off the track during a controlled roll-over is eliminated.

Medical Machinists

OUR ANSWER to some questions on micro-drilling from a Philadelphia doctor took us into a phase of Metalworking that gets little attention—the hospital machine shop. In this case the problem is artificially growing tumors and from the mass of medical terms we could recognize such things as glass-lined pumps and cell-isolation equipment with micro adjustments. Most of these highly specialized instruments are built in the hospital maintenance shop by the old principle of trial and error.

News of Metalworking

BOEING EXPANDS—Boeing Airplane Co. will spend $1½ million to expand its Seattle plant, and will add more than 3000 workers to its payroll in anticipation of big military orders. Already on order are two milling machines costing a total of $203,000, a $170,000 planer and magnesium surface treating facilities costing $119,000.

BRITISH TEAM HERE—A team of British specialists in metal finishing is now in this country studying American methods pointing to ways of achieving greater efficiency and productivity in the British industry. The group is here under auspices of the Anglo-American Council on Productivity.

RESEARCH FOUNDRY—International Harvester Co., Chicago, has dedicated the first unit in its new $1,200,000 research foundry, from which are expected to come such benefits as development of new techniques for production of castings, improvement in foundry working conditions, improvements in casting quality, better control of foundry materials and processes, improved efficiency of foundry operations, and reduction of costs.

MEN AND MACHINES—A year by year (1910-1950) study of the effect on employment of production workers when so-called labor-saving equipment is installed is contained in a booklet prepared by Denham & Co., Detroit, for Michigan Tool Co. The booklet reveals that in every year in which rate of installation of industrial equipment increased, this increase was accompanied by or followed by an increase in total employment of production workers in industry. Similarly, employment decreased with every decrease in rate of acquisition of new machines. Copies of the booklet are obtainable by writing Michigan Tool Co., 7171 E. McNichols Road, Detroit.

LABOR RELATIONS AWARD—The National Metal Trades Association's Industrial Relations Achievement Award will go this year to Harold S. Falk, president, Falk Corp., Milwaukee. The award will be made during the Metal Trades convention in New York, Sept. 27-29.

British Ship Tools to Iron Curtain Nations at $5.5 Million Annual Rate

RUSSIA AND HER SATELLITES will have received more than $5½ million worth of British machine tools by the end of 1950 if exports for the second half year approximate those of the first six months, when about $2.7 million in machine tools were exported to the USSR, Poland, and Czechoslovakia. (See table below).

• **Those are the facts** behind demands of machine tool builders here and abroad that a stop be put to exports of war-essential equipment to Iron Curtain countries. While such shipments have been a matter of common knowledge in the industry, they caught the public eye only when Winston Churchill disclosed in a radio speech what had been told him by Joseph Greenwood, chairman and managing director of Craven Brothers, Manchester: that his firm is just about ready to ship to Russia under a two-year-old contract machine tools which the British Government wants and could use right now for military production.

Prime Minister Attlee, answering Mr. Churchill's broadcast, stated that exports of machine tools "regarded as of key importance for strategic purposes" were stopped 18 months ago, except in the case of contracts already concluded before that date.

• **Here in the U. S.,** that explanation prompted Tell Berna, general manager of the National Machine Tool Builders' Association, to comment that "Mr. Attlee's reply reveals either an incredible ignorance of the nature and uses of machine tools, or the setting up of a limited forbidden-shipment list as a political cover-up for the extensive range of machine tools that England is continuing to sell to Russia and the red satellite nations."

"The fact is," Mr. Berna said, that "any workman in a metalworking plant knows that all machine tools, of whatever nature, are used in war production.

"Two and a half years ago the United States Government stopped shipments of all types of American machine tools to Russia and satellite nations, even though these machines had been built in fulfillment of contracts concluded before that time. Meanwhile England continues to ship not only quantities of machine tools which Attlee says will not 'damage essential defense needs,' but in addition keeps right on supplying the Russians with machines of the very types which he himself states are 'regarded as of key importance for strategic purposes.'

"This same muddled contradiction in policy is now being exhibited in West Germany. Among types permitted for sale to Russia and satellite nations are machines that will do the same sort of work as machines on the forbidden list. For example, you may not ship a vertical turret lathe; but you are allowed to ship a vertical boring mill.

The State Dept. says it has been trying to get other countries to tighten their export controls to match those of the U.S., but it's tough to do. Some countries have sizable Communist parties which have to be reckoned with; some have unemployment problems. In other words, the particular governments aren't as free to follow our wishes in the matter as we might wish them to be.

ECA officials point out also that when you talk of east-west trade, you have to consider three angles: (1) military security; (2) European recovery; (3) relations with our allies. No single consideration can give a satisfactory answer.

Average Monthly Machine Tool Exports to Iron Curtain Countries

Country	1938	1945	1946	1947	1948	1949	1950*
			Values in £				
Soviet Union	142,572	268,745	1,710	17,246	5,480	15,173	71,342
Poland	10,458	—	699	—	—	99,354	73,538
Czechoslovakia	12,101	—	—	—	41,444	28,267	18,694
			Quantities in tons				
Soviet Union	842	1,145	12	97	22	56	293
Poland	43	—	4	—	—	319	247
Czechoslovakia	44	—	—	—	217	90	47

*First six months

HERE ARE THE TANKS that will go to European participants in the Mutual Defense Assistance Program. They're "cocooned" at the Red River Arsenal, along with acres of other mobile equipment parked there since World War II. From these stockpiles vehicles are torn down and completely rebuilt before being shipped abroad to western Europe

National Production Authority to Control Allocations, Priorities

WASHINGTON — A National Production Authority has been formed to handle allocations, priorities, and inventory controls under the defense mobilization program. William H. Harrison, president of International Telephone and Telegraph Corp., was named by Secretary of Commerce Charles Sawyer to head the new agency, which will be under the overall authority of Department of Commerce.

The NPA, which in many respects replaces the War Production Board of World War II, will see to it that defense contracts will get preference over civilian production in the nation's shops and factories. This will be controlled through establishment of a priority and allocation system to be decided any day now.

The controls will mean inevitably a reduction in the supply of consumer goods.

In establishing the NPA, Sawyer transferred to the new agency 15 divisions of the Commerce Department's Office of Industry and Commerce. These divisions are: Machinery and Equipment, Small Business, Marketing, Iron and Steel, Metals and Minerals, Rubber, Textiles and Leather, Forest Products, Chemicals, Construction, General Products, Motion Pictures, Foods, Petroleum, and Fuels and Energy.

Mr. Sawyer said in establishing the NPA that allocation and priority powers will be used "only as it becomes necessary; our effort will be to undertake a constructive but not timid approach to the problems which this order imposes on us."

First in a series of conferences dealing with establishment of a priority and allocation system was held last week when the heads of 21 steel companies met with Mr. Harrison and Secretary Sawyer.

No allocations of steel and other scarce materials are likely until the government announces a scarcity list of materials considered illegal to hold, such as steel, aluminum, zinc, copper, rubber.

In World War II Mr. Harrison served as director of the Production Div., War Production Board, and later as chief of the Procurement and Distribution Service of the Army Signal Corps., with the rank of major general.

Sales Representatives Named

Westcott Chuck Co., Oneida, N. Y., has appointed Norman Durrie Sales Co., Chicago, as its district representative in northern Illinois, northern Indiana, eastern Iowa, eastern Wisconsin, and the upper peninsula of Michigan. Norman Durrie Sales Co. succeeds Westcott's previous Chicago district sales manager, S. A. Dinsmore.

Seneca Falls Machine Co., Seneca Falls, N. Y., has named McNett & Hodson, Cleveland, as representative for northeastern Ohio.

Lovejoy Tool Co., Inc., Springfield, Vt., has named C. B. DeKorne, Cutting Tools, Grand Rapids, Mich., as sales representative for western Michigan.

Hendey Machine Co., Torrington, Conn., has discontinued its sales office at 1534 Dime Bldg., Detroit, and is being represented in the Michigan territory by Associated Machinery Sales of Detroit and Clarkston, Mich. Fred C. Ahrendt Co., Toledo, has been named Lovejoy representative in Toledo, northwestern Ohio and southern Michigan.

Ferracute Machine Co., Bridgeton, N. J., has named Kurt P. Wesseling of K. P. Wesseling Co., St. Louis, as agent in the St. Louis territory.

Cogsdill Twist Drill Co., Detroit, has named L. R. Clowes, Inc., as representative in the New England area, covering Maine, New Hampshire, Vermont, Massachusetts, and Rhode Island.

Hartford Special Machinery Co., Hartford, Conn., has appointed the following representatives: Dayton & Bakewell, Los Angeles, to handle swagers, die polishers and Super-Spacers; Hoffman & Heartt, Los Angeles, to handle automatic drilling and tapping machines and the Hartford thread roller; Thomas Wallace, Los Angeles and San Francisco, Super-Spacer and sensitive drilling machines; and William Scheer Co., St. Louis, automatic drilling and tapping machines, thread roller, die polishers and sensitive drilling machines.

Plants Bought, Merged

Hupp Corp., Cleveland, has purchased the capital stock of Ackerman-Blaesser-Fessey, Inc., automotive window regulator manufacturer in Detroit. Hupp's new all-electric window and seat regulator program will be extended into both firms.

Dodge Mfg. Corp., Mishawaka, Ind., has acquired all capital stock of Chicago Thrift Co., manufacturer of small metal and plastic banks and of etched metal products such as nameplates, clock and instrument dials, novelties, etc. In 1944 Dodge, maker of power transmission machinery, acquired Etching Co. of America, Chicago. Plan is to bring about merger of the two subsidiary companies, operations then to be conducted under name of Chicago-Thrift-Etching Corp.

Oliver Iron & Steel Corp. (Pittsburgh) interests have purchased management control stock of Berry Motors, Inc., Corinth, Miss., manufacturer of hydraulic transmissions and liquid transfer pumps. Berry Motors has developed a new patented principle in industrial hydraulics which utilizes a rotary piston instead of a common reciprocal type. The company is about to enter the market with a fully developed line of hydraulic transmission units, operating in the intermediate high pressure range.

Wm. K. Stamets Co., Pittsburgh, has purchased Enterprise Co., Columbiana, Ohio, machinery manufacturers. Enterprise was acquired for use by Stamets as a manufacturing plant for Stamets special machinery. It will also continue operating as a contract shop.

Michigan Tool Co. has sold Tungsten carbide Tool Co. to A. E. Tozer, general manager of the firm since its founding in 1928. Tungsten Carbide expects to move into a new plant this month at 26250 W. Seven Mile Road, Detroit.

Erie Forge Co. capital stock and that of a subsidiary has been purchased for $4.5 million by a group headed by E. Richard Ebe and Mortimer S. Gordon of New York. The new owners plan expansion of facilities of the Erie, Pa., manufacturer of crankshafts for diesel engines.

Machine Tool Industry Heads To Review Mobilization Plans

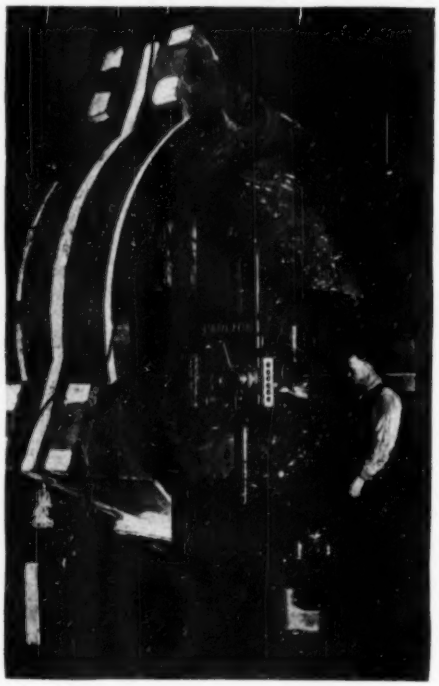
DETROIT — Representatives of all branches of the machine tool industry will meet at the Royal York Hotel in Toronto, Canada, on October 10 to review mobilization plans of the industry in the light of world developments. Chairman of the group is Herbert L. Tigges, vice president of Baker Bros., Toledo, and president, American Society of Tool Engineers.

The joint activity, known as the Joint Machine Tool Industry Mobilization Reserve Group, originally was an outgrowth of preparedness activities of the Manufacturing Production Division of National Security Resources Board. It has been meeting independently as an industry mobilization group to insure maximum preparedness of the machine tool industry at all times.

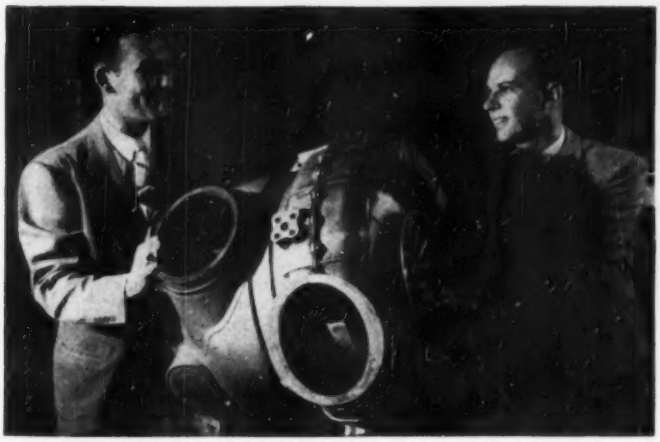
• **Tentative agenda** of the meeting will include talks by Mr. Tigges; General S. E. Reimel of NSRB; David Ayr, president, National Machine Tool Builders' Assn., and others, including a representative of the Canadian Machine Tool Industry.

Group members who will participate with short talks include: E. C. Adams, Lincoln Lubricating Systems, Inc., New York, who will talk on Production Control "E-1-B"; Edgar J. Seifreat, president, Seifreat-Elstad Machinery Co., Dayton, on "Diversions"; Victor Gottsman of Victor Gottsman Machinery Co., Detroit, on putting idle machines to work in the event of an emergency; and C. E. Needy of Landis Tool Co., Waynesboro, Pa., who will discuss phantom pool orders.

These industrial and trade groups are active in the Mobilization Reserve Group: NMTBA, National Machine Tool Distributors Assn., Machinery Dealers National Assn., National Tool & Die Manufacturers Assn. Representatives of these organizations will attend the Toronto meeting. Also represented in the group are machine tool companies not members of the NMTBA.



THIS HUGE butterfly valve casting, weighing 18,000 lb and measuring 9 ft in diameter, was drilled recently with a Carlton 4-A radial by the Newport News Shipbuilding & Dry Dock Co. for the Tracy Pumping Plant, Bethany, Calif. The radial is shown drilling holes for fastening seats to the valve body



NEW CH9 TURBOSUPERCHARGER is inspected by M. K. Wolfson and W. O. Meckley, engineers of General Electric's Aircraft Gas Turbine Divisions. Test stand operations of a Pratt & Whitney R-4360-C engine equipped with the new turbo have resulted in 32% more takeoff power and more than 20% decrease in fuel consumption as compared to the R-4360 engine equipped with its BH4 turbo

Here Are Latest Defense Contracts

WASHINGTON—Electronic and aircraft industries are maintaining their positions as leading producers of war goods, according to the latest announcement of contracts awarded by Army, Navy and Air Force. Following are awards valued at $100,000 and over:

ARMY

Lewyt Corp., Brooklyn, N. Y., radio sets, $200,000.

Federal Tele. & Radio Corp., Clifton, N. J., radio sets, $3,000,000.

General Electric Co., Syracuse, N. Y., VT fuses, $150,000.

Parish Pressed Steel Co., Reading, Pa., rec'ls, $1,760,250.

Sperry Gyroscope Co., Great Neck, N. Y., radar sets, $4,000,000; electronic tubes, $242,356.

Hammarlund Mfg. Co., New York, radio receivers, $100,000.

Western Electric Co., Inc., New York, radio sets, $100,000.

Johnson Service Co., Milwaukee, radiosonde modulator units, $100,000.

Molded Insulation Co., Philadelphia, radiosonde transmitter units, $134,000.

Radio Corp. of America, Camden, N. J., radio sets, $270,000.

Aerial Products, Inc., Elkton, Md., bomb fuzes, $107,080.

Chefford-Master Mfg. Co., Inc., Fairfield, Ill., metal parts for fuzes, $151,405.

International Harvester Co., Industrial Power Div., Melrose Park, Ill., utility vehicles (value not given).

Continental Motors Corp., Detroit, engine assemblies, $5,000,000.

Pacific Car & Foundry Co., Renton, Wis., gun motor carriages (value not given).

Massey-Harris Co., Racine, Wis., howitzer motor carriage (value not given).

Heckethorn Mfg. & Sup. Co., Littleton, Colo., shells, $99,950.

R. G. LeTourneau, Peoria, Ill., scrapers, $651,000.

M. R. S. Company, Jackson, Miss., scrapers, $375,000.

LaCrosse Trailer Co., La Crosse, Wis., trailers, $315,000.

Eidal Mfg. Co., Albuquerque, N. Mex., trailers, $172,396.

Hyster Co., Portland, tractors & cranes, $590,439.

Gear Grinding Machine Co., Detroit, front axle shafts and axle repair kits, $235,475.

Ainsworth Mfg. Corp., Detroit, windshield assembly frames, $119,752.

Diamond T Motor Car Co., Chicago, engine accessories, assemblies, $2,311,808.

Transmitter Equipment Mfg. Co., New York, radio terminal sets, $192,928.

Monroe Automobile Equipment Co., Monroe, Mich., heat shells, $284,722.

Gibson Mfg. Co., Longmont, Colo., cartridge cases, 20mm, $908,225.

New Britain Machine Co., New Britain-Gridley Machine Div., horizontal automatic chucking machine, $142,200.

South Bend Lathe Works, South Bend, Ind., lathes, $170,731.

Caterpillar Tractor Co., Peoria, Ill., tractors, $1,251,942.

NAVY

Aluminum Co. of America, Washington, D.C., aluminum, alloy plates, tubing and channels, $180,885; aluminum tubing and aluminum plates, $3205,664.

Reynolds Metal Co., Louisville, Ky., aluminum tubing, shape and extrusions, $507,787.

General Electric Co., Philadelphia, repair parts for main propulsion turbines and auxiliary turbo generators, $142,363.

American Laundry Machinery Co., Los Angeles, ironers, washing machines and cookers, $110,238.

Cleveland Pneumatic Tool Co., Cleveland, brace assemblies, drag for use on shock strut-nose for P4M aircraft, $121,249.

Champion Spark Plug Co., Toledo, Ohio, spark plugs, aircraft engine, $259,625.

United Aircraft Corp., Chance-Vought Aircraft Div., Dallas, Tex., spare parts, mod. various kits, assemblies, etc. for F4U-4-5 aircraft, $95,000.

Lavoie Laboratories Inc., Morganville, N. J., oscilloscope & maintenance spare parts, $195,525.

General Motors Corp., Cleveland Diesel Engine Div., Cleveland, A-C diesel generator set, $100,000.

Reynolds Metals Co., Louisville, Ky., flat bar aluminum alloy, $115,796.

Unique Mfg. Co., Inc., Chicago, abandon ship ration containers, $128,500.

Regent Mfg. Co., Inc., Downey, Calif., aviation tripod wing jack, $156,511.

Bendix Aviation Corp., Scintilla Magneto Div., Sidney, N. Y., magneto assembly for aircraft, $114,863.00.

Fairchild Camera & Instrument Corp., Jamaica, N. Y., relay for aviation armament, $192,092.

J & L Steel Barrel Co., New York, shipping metal container assembly, $153,231.

AIR FORCE

Beech Aircraft Corp., Wichita, Kans., tank assemblies, $750,000.

Ryan Industries, Detroit, chaff dispensers, $356,027.

Rhodes Lewis Co., Culver City, Calif., charger, 20 mm automatic modify feeder slides, $2,473,894.

Vic Pastushin Industries, Inc., Los Angeles, tank assemblies, $1,394,250.

General Motors Corp., Allison Div., Indianapolis, spare parts for engines used in F-82 aircraft, $150,000.

Sperry Corp., Sperry Gyroscope Div., Great Neck, L. I., compass components, $658,548.

York Band Instrument Co., Grand Rapids, Mich., misc. spare parts, assemblies, and subassemblies, $153,660.

Bowser, Inc., Ft. Wayne, Ind., tank assemblies, $748,600.

Cornelius Co., Minneapolis, spare parts for compressor assemblies, $193,014.

General Electric Co., Schenectady, N. Y., special tools & test equipment & data, $275,000.

Curtiss-Wright Corp., Curtiss-Wright Propeller Div., Caldwell, N. J., kit assemblies for B-50 & B-29 airplane propellers, $109,296; propellers and propeller spare parts, $200,000.

Fairchild Engine & Airplane Corp., Fairchild Aircraft Div., increase in spare parts, $1,000,000.

H. W. Lond Machine Works, Pomona, Calif., misc. cylinder assemblies for F-80 aircraft, $149,586.

Peace Products Div., Bedford, Ohio, fuel booster pumps, $103,207.

Dixon Mfg. Co., Inc., Coffeyville, Kans., hydraulic jacks, $395,783.

Fine Organics, Inc., New York, carbon removal compound, $158,017.

Vactron, Inc., Waltham, Mass., servo test stand assemblies, $143,200.

Bowser, Inc., Ft. Wayne, Ind., meter assemblies, $297,994.

Utility Metal Products Co., Inc., Beverly, Mass., purchase of wall lockers, $289,400.

Westbolt Mfg. Co., Wichita, Kans., aerial delivery kits for jeep, $529,176.

Polan Industries, Huntington, W. Va., aerial delivery kits for jeep, $544,275.

Waco Aircraft Co., Troy, Ohio, aerial delivery kits, $444,657.

Beaumont & Crandell, Kansas City, Mo., webbing for jeep kits, howitzer kits, 6000-lb load platforms, extraction kits, $540,078.

Meade Aviation Equipment Co., Trenton, N. J., aerial delivery kits, $154,590.

Bell-Howell Co., Chicago, cameras with lenses and spare parts, $1,040,153.

Tiedex, Inc., Newark, N. J., high tension ignition harnesses, $2,534,280.

Connecticut Telephone & Electric Co., Meriden, telephone systems, $2,544,000.

Bendix Aviation Corp., Eclipse-Pioneer Division, Teterboro, N. J., starters $124,299.

Eicor, Inc., Chicago, alternators, $113,400.

Borg-Warner Corp., Pesco Products Div., Bedford, Ohio, fuel booster pumps, $229,142.

Fenwal, Inc., Ashland, Mass., items of fire detectors and thermo switches, $121,050.

Curtiss-Wright Corp., Wright-Aeronautical Div., Wood-Ridge, N. J., modification parts for engines, $3,854,605.

Douglas Aircraft, Santa Monica, Calif., miscellaneous spare parts, $1,414,653.

North American Aviation, Los Angeles, modification kits for airplanes, $200,817.

Simmonds Aerocessories, Inc., Tarrytown, N. Y., boost control assemblies and spare parts for aircraft, $253,929.00.

Piper Aircraft Corp., Lock Haven, Pa., USAF model L-18 airplane with engines, spare parts and data, $222,362.

Ingersoll-Rand Co., Rochester, N. Y., compressors, $307,977.

Pioneer Air Compressor Co., New York, compressors, $152,468.

MEETINGS

Sept. 18-22—National Instrument Conference and Exhibit; Memorial Auditorium, Buffalo.

Sept. 19-21—ASME Fall meeting; Hotel Sheraton, Worcester, Mass.

Sept. 23-26—Packaging Machinery Manufacturers Institute, annual meeting; The Homestead, Hot Springs, Va.

Sept. 25-27—National Electronic Conference; Edgewater Beach Hotel, Chicago.

Sept. 26-29—Association of Iron & Steel Engineers, annual convention and 1950 Iron & Steel Exposition, public auditorium, Cleveland.

H. P. Chaplin

J. A. Gerard

Roger E. Mitchell

Frank B. Rackley

Names in the News

H. P. Chaplin has been elected president and treasurer, and **J. A. Gerard** vice president in charge of sales, of Cone Automatic Machine Co., Windsor, Vt., builder of automatic lathes. **H. P. McClary,** formerly president, has been named chairman of the board; **L. L. Cone,** vice president; and **A. B. McClary,** secretary. Mr. Chaplin long has been general manager and treasurer of the Cone company. Mr. Gerard heretofore was export sales manager.

Edward P. Gillane has been appointed vice president and general manager of Potter & Johnston Co., Pawtucket, R. I., and **Wilfred J. Pender** has been named factory manager. **J. Earle Makant** has resigned as vice president and factory manager. Mr. Gillane joined Potter & Johnston in March, 1948, when the plant was taken over by Pratt & Whitney Div. of Niles-Bement-Pond Co., Hartford, Conn., becoming vice president and controller. Mr. Pender joined the firm in 1923, enrolling in the shop training course. In 1948 he was named assistant factory manager. Mr. Makant is retiring after 34 years.

Roger E. Mitchell, assistant general master mechanic at the Buick plant, Flint, Mich., has been named general master mechanic, succeeding **Fred C. Pyper,** retired. Mr. Mitchell started at Buick in 1915 as a draftsman in the engine plant and was master mechanic at Buick's Melrose Park, Ill., aviation engine plant during the war.

John A. Menster has been named assistant manager of sales, Welded Tube Div., Babcock & Wilcox Tube Co., Alliance, Ohio.

John J. Curry, former resident manager of the New Departure Div., General Motors Corp., at Sandusky, Ohio, has been transferred as resident manager to the plant in Meriden, Conn. Succeeding him as resident manager at Sandusky is **Alfred F. Herold.**

Don C. Stablein has been named general sales manager, K. O. Lee Co., Aberdeen, S. D., succeeding **Don T. Lyons,** who recently resigned to become general sales manager of Bishman Mfg. Co., Osseo, Minn.

Frank B. Rackley has been elected president of Jessop Steel Co., Washington, Pa. At the age of 33, he is the youngest president of a steel producing company in the United States. He joined Jessop in June, 1948, as general manager of sales, was made vice president in charge of sales in October, 1948, and executive vice president in May, 1949.

Carl Voorhies has been named chief engineer, Valve Tappet Div., Chicago Screw Co., Bellwood, Ill. He has been serving as consultant to several automotive manufacturers.

H. J. Hunkele, Jr., has been named assistant manager, Sales Engineering Div., Caterpillar Tractor Co., Peoria, Ill.

William A. Meiter has been named to the newly-created position of central sales manager, Worthington Pump & Machinery Corp., Harrison, N. J. He will direct sales of Buffalo, Detroit, Cleveland, Cincinnati and Pittsburgh offices. **John W. Stovall** has been named manager of the Buffalo district sales office, succeeding Mr. Meiter. **Thomas F. Quinlan** has been named works comptroller at Harrison, succeeding the late **Wilbur H. Stacy.**

Edward P. Gillane

Wilfred J. Pender

J. Earle Makant

William A. Meiter

Eight Miles of Conveyors in New De Soto Plant

Expansion means increased production of bodies, engines to be handled by 5000 workers

DETROIT—De Soto's manufacturing operations have been expanded with several million dollars spent for new De Soto body and engine-building facilities in the company's huge Warren Avenue plant in Dearborn. The expanded operation will require approximately 5000 employes, equally divided between body and engine building.

The Warren Avenue plant was almost completely rebuilt, with about two-thirds of the floor space devoted to production of bodies. Nearly eight miles of conveyors wind throughout the body plant. All body conveyors are electronically controlled, the largest installation of its kind in American industry.

• **The De Soto body** is all-steel, welded together. The welding department is equipped with 540 separate welding machines and guns, each designed for a specific job. One machine produces 198 welds in 17 sec at the push of a button.

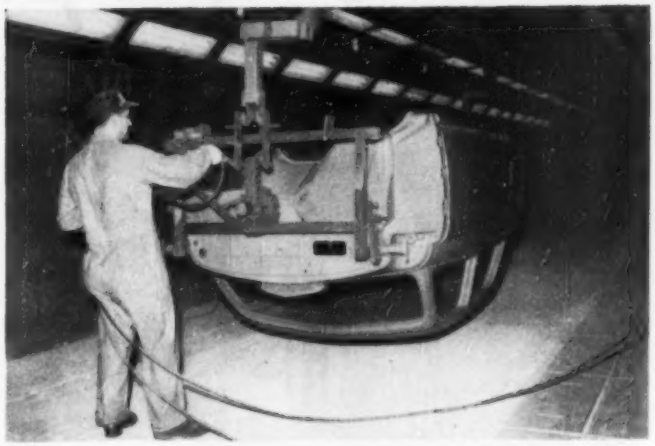
The paint department is a plant within a plant, walled off from the welding and trim departments, and has a complete air-conditioning system that makes it almost impossible to detect any paint odor.

Unloading platforms along the material receiving dock are electrically operated and can be raised and lowered so that they are always flush with the beds of the delivery trucks. Fork lifts carry the newly-arrived material to the conveyor lines. The lines dip down where they are to be loaded, carry the loads through the plant high in the air, and descend again where the material is to be removed.

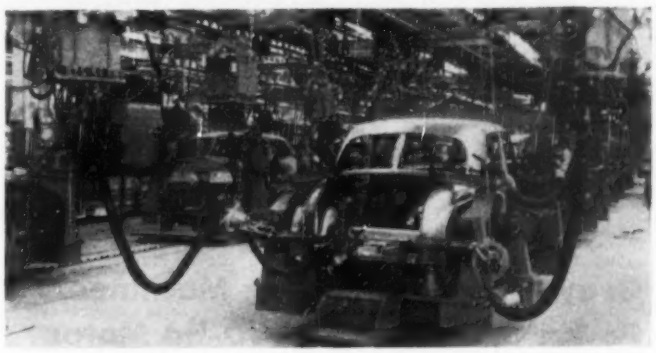
• **Bodies on the conveyor** system are carried either through the air or along the floor, whichever best suits a particular operation. Perfect synchronization of the upper and lower conveyor permits transfer of bodies from one to the other without human effort.

A De Soto-designed conveyor attachment permits the body to rotate in a circle so that all sections of it can be easily reached.

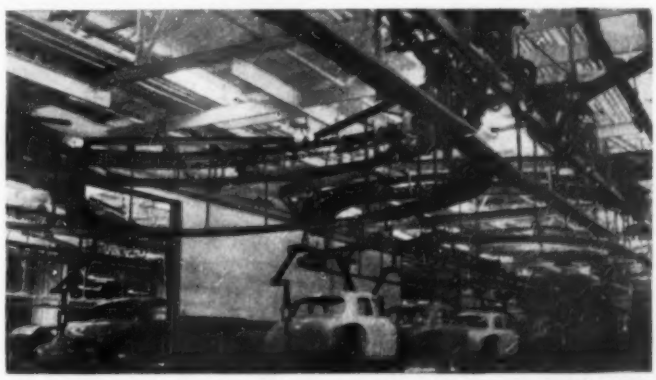
Much thought went into employe working conditions. Every effort was made to eliminate hard labor. The plant is clean, well-illuminated, attractively painted, and free from dirt, dust and odors.



BODY-HOLDING ATTACHMENT on conveyor permits body to be rotated laterally in a complete circle so that spray booth workers can paint any part of it without bending, climbing, or stretching. Bodies go through the drying oven in this upside-down position, dirt and paint dripping off the body instead of remaining on top

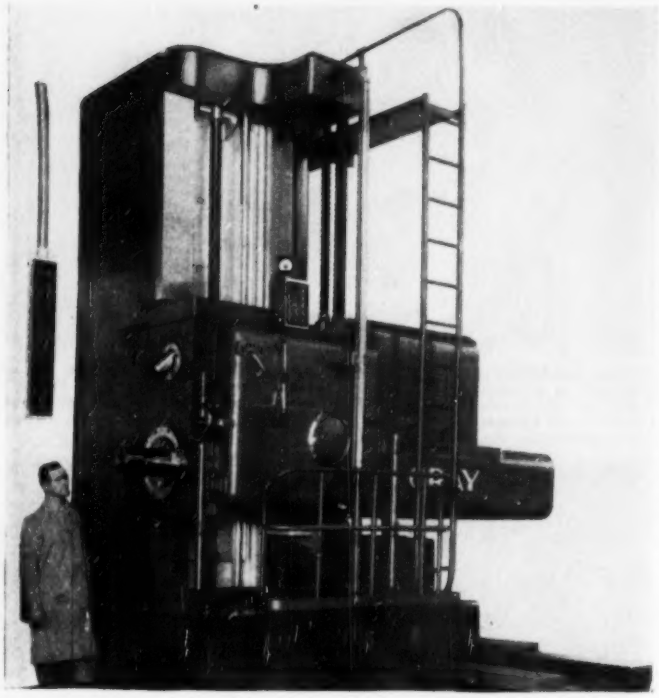


IN WELDING DEPARTMENT, bodies being welded move along a circular assembly line, known as a "carrousel"



IN "GRAND CENTRAL STATION" section of plant bodies automatically weave and criss-cross on a bewildering maze of conveyors, all without any apparent human direction

New Shop Equipment



Gray Horizontal Boring Machines Power Spindle With 100-Hp Motor

Models of the Gray horizontal boring, drilling, and milling machines are being produced in the 7- and 8-in. floor-type.

Spindle motors of 50 to 100 hp are designed to utilize heavy-duty carbide milling cutters working at maximum capacity. Precision boring and drilling are facilitated by 24 spindle speeds in geometric progression up to 600 rpm on the main spindle. Continuous bar feed and traverse up to 84 in. is available.

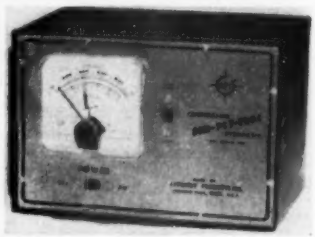
Two feed motors permit independent feeding of head and column. Full pendant-station control provides automatic power-clutch shifting and automatic hydraulic clamping. Spindle speeds are changed by the Insto-Shift device.

Non-metallic ways insure prolonged accuracy of the main guide surfaces. The electric Woodpecker permits quick power positioning of the head and column to an accuracy of 0.00025 in. or less.

The Gray Co., 3611 Woodburn Ave., Cincinnati 7, Ohio.
(MORE DATA? CIRCLE FYI 31, p. 157)

Cleaning solvent of the self-emulsifying type is claimed to be fast wetting, rapid penetrating, and to have rinsing properties that insure wetting of deep recesses. Known as S.E.C. it can be used as a presoak to remove impacted buffing compounds, drawing oils and compounds, sulphurized and chlorinated cutting oils, greases and soaps. It will not attack metals, and is said to be nontoxic and practically odorless.

Chemclean Products Corp., 6½ Sixth Ave., New York 13, N. Y.
(MORE DATA? CIRCLE FYI 71, p. 157)



Pyrometer Protected From Thermocouple Burnout

This pyrometer is provided with automatic protection from thermocouple burnout.

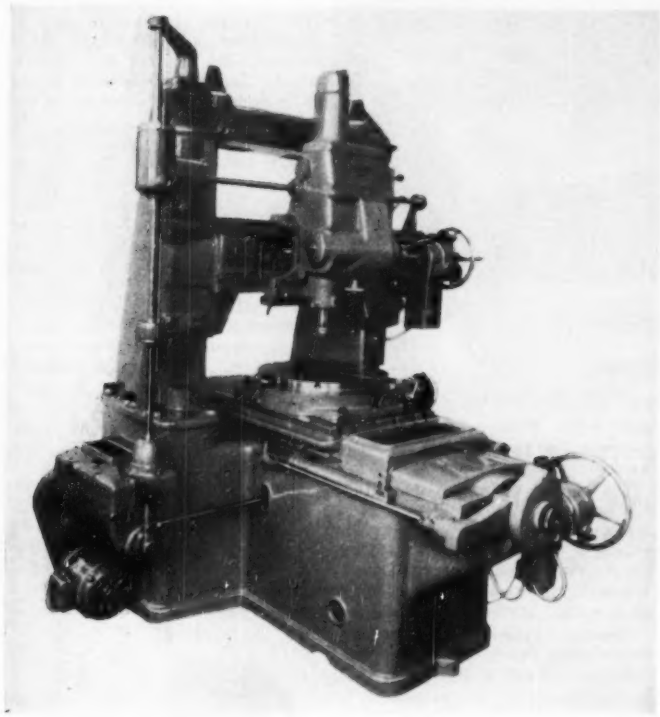
Called the Simplytrol, it is a thermocouple millivoltmeter controller with control action obtained by direct contact in the meter. No vacuum tubes or motors are used. The contact meter-relay operates directly into the load switch. Electric, oil or gas-fired equipment may be controlled.

Eight standard ranges cover temperatures from —75 F to 3000 F. Models with automatic protection shut off the power immediately in case of thermocouple failure.

Assembly Products, Inc., Chagrin Falls, Ohio.
(MORE DATA? CIRCLE FYI 32, p. 157)

CABLE REELS and materials on spools can be transported and positioned with this hydraulic truck. The opening between the base forks and elevating forks is 15 in., and the elevating forks lower to 14 in. and elevate to 28 in. Single-speed hydraulic hand pump and hydraulic cylinder actuate the lifting mechanism.—*LYON-Raymond Corp., 4774 Madison St., Greene, N. Y.*
(MORE DATA? CIRCLE FYI 33, p. 157)

Materials and Parts



Hauser Jig Borer Has Increased Capacity

Table surface, 29½ x 24½ in.
Longitudinal table-slide travel 28-in.
Transverse boring-head travel, 20 in.
Vertical boring spindle travel, 9 in.
Max. dist. spindle to table, 28½ in.
Max. dist. between columns, 35½ in.
Taper in boring spindle, No. 4 Morse
Spindle speeds 18, from 45 to 2000 rpm
Max. drilling capacity, 1⅝ in.

Designated as the Hauser Type 5, this jig borer is the result of the demands of industry for a machine of larger capacity. The maximum boring capacity is 9 in. and vertical travel of the boring spindle is the same.

Said to be designed for maximum rigidity without excessive weight, the unit weighs 7,000 lb. All leadscrews are precision ground from stabilized steel, then optically checked for minor pitch errors which are compensated for by corrector bars. Guaranteed accuracy of slide locations is 0.0002 in. Settings are read to 0.0001 in. on vernier scales.

Attention has been paid to operator convenience, and all controls are placed to promote high efficiency on his part. Individual electric-motor drives for table motion, vertical movement of the transverse slide, and transverse movement of the boring head increase the operator's productivity. There are 6 feeds of the boring spindle in each direction, ranging from 0.0008 to 0.0080 ipr.

Hauser Machine Tool Corp., 30 Park Ave., Manhasset, N. Y.

(MORE DATA? CIRCLE FYI 34, p. 157)

... INCLUDING

Shears have a magnetic support to hold light-gage sheets level for accurate cutting.....page 150

Planing device trims welded rails while hot, reducing costs of grinding .....page 151

Tangent bender forms metal cabinets in one piece, at rates up to 400 bends per hour.....page 152

Nutsetters have an anglehead to facilitate assembly in tight places .....page 154

Punch press has an increased tooling height to provide for larger diesets .....page 164

Nipple threader threads, reams, and chamfers blanks in a continuous automatic operation.....page 166

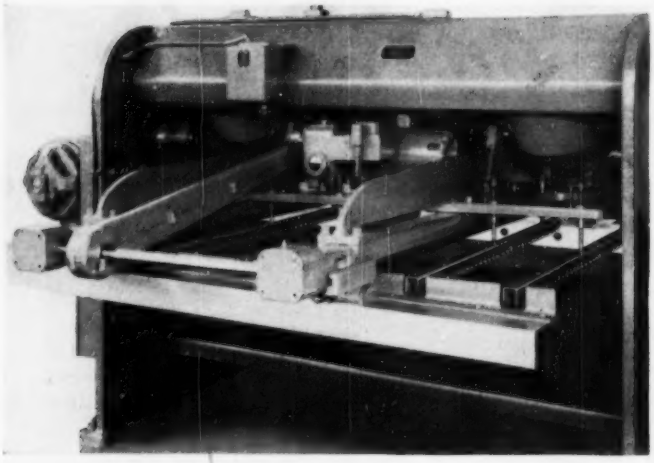
Rotary joint transfers liquids to and from revolving drums through the axle .....page 168

NEW BULLETINS for your Shop Library, including a 32-page catalog covering a line of grinders for many uses.....pages 157 and 158

... and in October 2

Shaper with 9 or 10 all-geared speeds up to 200 spm, and 8 automatic reversible feeds

Cagenut that locks in place by dropping it over two pre-punched loops that can be pulled up with ordinary pliers.



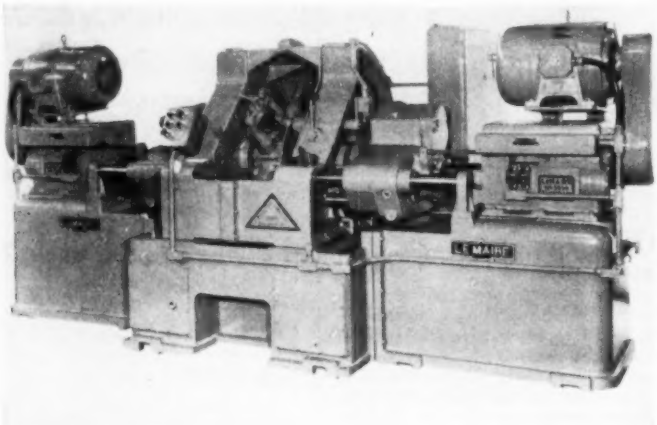
Magnetic Sheet Support Put in Cincinnati Shears

A 20-gage sheet extending 20 inches beyond the knife of a shear will sag approximately 5 in. This often makes it impossible to accurately gage the sheet with a back guide bar. Cincinnati Shaper uses permanent Alnico magnets to support the sheet so that it can be pushed back against the back angle for accurate gaging.

A roller arrangement provides easy handling of the sheet when feeding the shear. There is no noticeable drag on the sheet due to the magnetic holding, and the back pieces will automatically strip off as the piece is cut. When cutting plate, the magnets can be raised to eliminate wear and possible damage.

The support is designed to handle all magnetic materials up to 16-gage thickness and can be supplied with either a 36 or 48-in. back-gaging range. At present, the support is available as extra equipment only on new Cincinnati shears.

Cincinnati Shaper Co., Hopple, Garrard & Elam Streets, Cincinnati, Ohio
(MORE DATA? CIRCLE FYI 35, p. 157)



DRILLER consists of a fabricated-steel center base which supports the fixture trunnion and houses a coolant tank. Each of two cast-iron end bases support a twin-ram unit for driving and feeding a three-spindle head mounted on guide bars. The trunnion carries four fixtures and is manually indexed. The machine drills, counterbores, and reams a steering gear idler and third arm bracket. —*LeMaire Tool & Mfg. Co., Dearborn, Mich.* (MORE DATA? CIRCLE FYI 36, p. 157)

Double-Solenoid Valve Controls Hydraulic Circuit

This four-way hydraulic valve is double-solenoid operated to semi-automatically control a hydraulic circuit. Located at each end of the valve body, the solenoids are of the push type.

Principal feature of the design, known as Series 5500, is a hydraulically balanced piston which has an integral spool and stem. The entire piston surface is hardened, ground and lapped. Grooving minimizes the possibility of binding under high pressure conditions.

The valves are offered with either standard or spring-centered action; single-solenoid operated with spring return; and solenoid-pilot operated. They are available in ¼, ⅜, ½, ¾ and 1 in. sizes, and for standard 110, 220 and 440 volts, 50 or 60 cycles.

Rivett Lathe & Grinder Inc., Brighton 35, Boston, Mass.
(MORE DATA? CIRCLE FYI 37, p. 157)

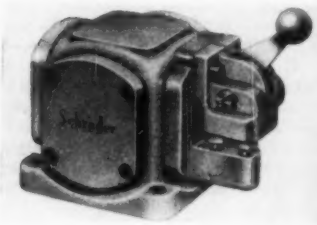
Fractional-Horsepower Motors Tested by GE Dynamometer

Designed by GE, this fractional-horsepower dynamometer is used in analyzing and demonstrating fractional-horsepower motors, generators, and internal-combustion engines.

The fractional-horsepower dynamometer is a dc unit, separately excited by 115-volts dc and suitable for operation from a 125-volt power source. The shaft and frame of the generator are cradled in sealed ball bearings to form a trunnion mount. This allows a maximum of freedom from static friction. The base is made of cast iron and has longitudinal slots so that varying size motors or mechanical units may be used.

Two resistor units of 500 watts each are located on the rear of the instrument panel for loading the dynamometer as a generator. The dynamometer scale is preloaded which allows torque readings in either direction of rotation, and is accurate to ¾ of an ounce. Generator absorption is 1 hp continuous.

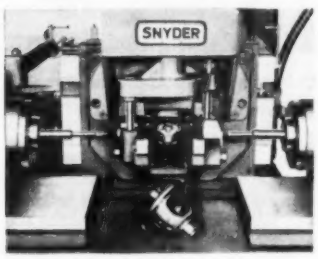
General Electric, Schenectady, N. Y.
(MORE DATA? CIRCLE FYI 38, p. 157)



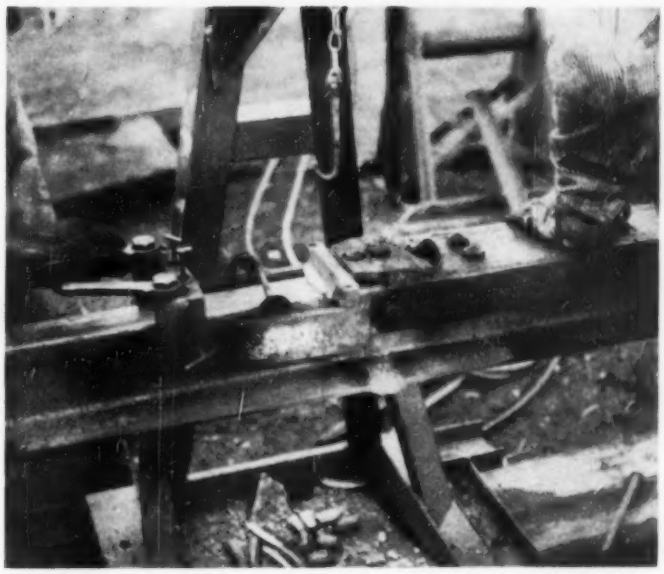
Four-Way Air Valve Is Designed for Base Mounting

Four-way air-control valve is designed for base mounting with manifold pipe ports for concealment of piping. It is for unrestricted air passage of 259 cfm at 100-psi line pressure. The actuating medium is a sliding-seal valve, while the main body has a diaphragm sealing action.

A Schrader's Son Div., Scovill Mfg. Co., Inc., 470 Vanderbilt Ave., Brooklyn 17, N. Y.
(MORE DATA? CIRCLE FYI 39, p. 157)



ROUGH OR FINISH MILLING of two spherical gear seats inside a differential gear case is accomplished by this high-production machine. The malleable-iron workpiece is clamped automatically by a hydraulic power unit and automatically indexed into position for milling one side and then the other. The carbide cutter is held in a yoke on a stationary bracket, the part being loaded over it. Tool speed is 80 fpm, feed 3.5 ipm, and stroke 4 in. *—Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit, Mich.*
(MORE DATA? CIRCLE FYI 40, p. 157)



Hot-Planing Device Trims Welded-Rail Costs

A hot-planing device uses tools tipped with Haynes Stellite hard-facing alloy to trim the top and sides of rails after pressure-welding. In the past, excess metal formed at the weld was trimmed with an oxyacetylene torch. As it is difficult to trim this upset close to the rail surface, an excessive amount of grinding was needed on the area.

Rail is trimmed right after it leaves the pressure welding machines. If there is a delay to cause the weld area to drop below 2000 F, the temperature at welding, the metal is reheated with a torch. The rail is clamped in place, then a hydraulic ram works three blades that plane the rail surface to a close tolerance. The blades will make over 1,000 cuts without sharpening or replacement.

The Oxweld Railroad Service Co., Unit of Union Carbide and Carbon Corp., 230 N. Michigan Ave., Chicago 1, Ill.
(MORE DATA? CIRCLE FYI 41, p. 157)

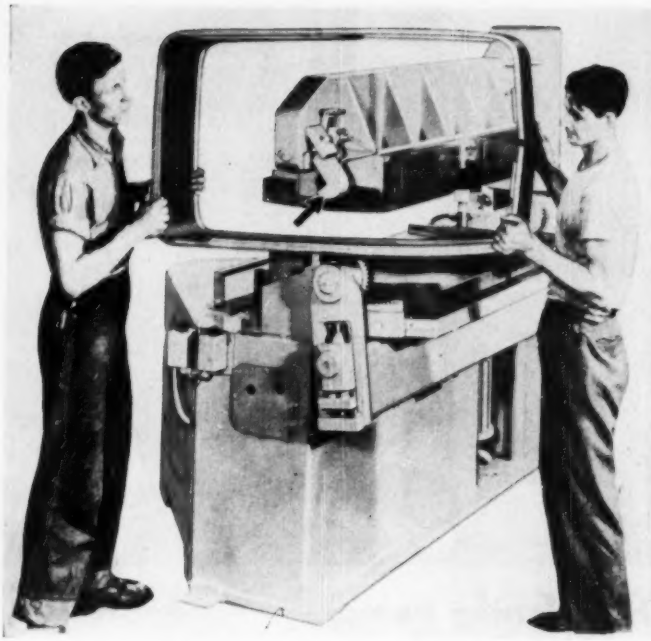
Constant Torque, Long Running Characterize Spring Motor

Spring motors are being designed around an elastic member made from pre-stressed flat spring stock called the Neg'ator. The motors are characterized by a constant output torque, and a long running time. The Neg'ator permits design of such spring motors because of its ability to exert constant or even decreasing force with increasing deflection. This is possible because only a small increment of length of the long coil is being deflected from its natural position at any instant, whereas the entire length of a conventional power spring is involved in generating the torque.

Energy is stored in a Neg'ator by deflecting each increment of length from its natural radius to a larger radius by forcibly winding the spring onto a large spindle.

The motor can be used for time recorders, mechanical recording instruments, automatic reels, anti-backlash mechanisms, and devices such as for balancing.

Neg'ator Div. Hunter Spring Co., 1 Spring Ave., Lansdale, Pa.
(MORE DATA? CIRCLE FYI 42, p. 157)



Cyril Bath Tangent Bender Forms Cabinets in One Piece

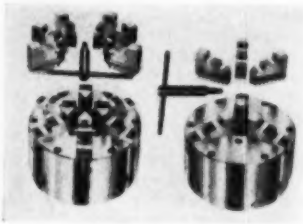
Metal cabinets can be formed in one piece on this tangent bender, at rates up to 400 bends per hour.

In action, the ram descends rapidly to within one inch of the bottom of its full stroke. At this point, latches at both ends of the ram engage levered arms on the bed and pull the ram down with a pressure of over 17 tons. Flat metal sheets can be blanked, punched or otherwise formed during this initial movement, and then held steady for the bending wing to move up and form the corner radius.

It is readily adapted to making bends of different radii, so that many types of cabinets may be formed on the same machine. It is known as an open-throat single-wing tangent bender.

The Cyril Bath Company, 6910 Machinery Ave., Cleveland 3, Ohio.

(MORE DATA? CIRCLE FYI 43, p. 157)



Chuck Combines Properties Of Scroll and Independent Types

This self-centering chuck is said to provide the flexibility and speed of scroll chucks, plus precision of four-jaw independent chucks. Tests show an inexperienced operator can adjust the jaws to within 0.0005 in 3 min.

The jaws, either 3 or 6, go in or out to grip the work like any scroll chuck. Precise adjustment is made by four opposed fine-threaded screws operating between the chuck body and its adapter. Duplicate second operations can be performed a great number of times without further chuck adjustment, and the need for collets is eliminated.

They are made in four-, five-, and six-inch diameters with three models: three and six step-jawed chucks with external and internal jaws, and a six-jaw chuck for external grip only.

Buck Tool Co., 2015 Schippers Lane, Kalamazoo 62, Mich.

(MORE DATA? CIRCLE FYI 44, p. 157)

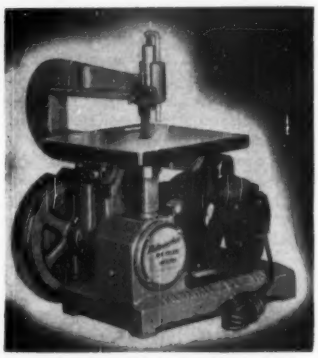
T-Slots in Welding Table Facilitate Assembling

Built of semi-steel, this welding table is 6-in. thick and provides a rigid, smooth, and square surface. T-slots facilitate assembling and locating.

It is sold with an all-steel stand which is equipped with lock screws, enabling the user to level a plate quickly and lock it securely. The number of screws vary from 19 on the 30x60-in. size to 59 on a 54x144-in. size. The other standard size is 48x96 in., other sizes to order.

Challenge Machinery Co., Grand Haven, Mich.

(MORE DATA? CIRCLE FYI 45, p. 157)



Leveling Device Changed In Milwaukee Die Filers

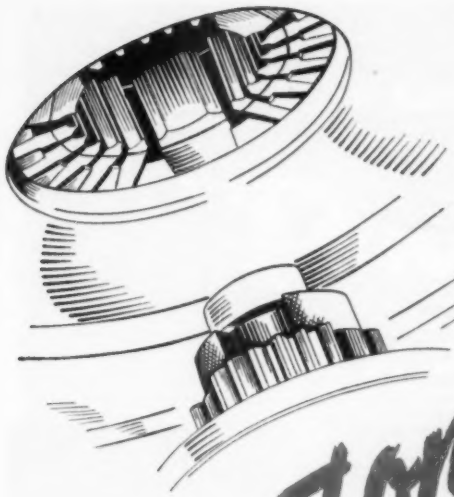
To bring the table back to a horizontal or level position, Milwaukee die filers are using dowel pins through matching holes in the pivot bracket. The table can be leveled without the use of a surface plate indicator.

The table design has been further changed from a 2-way to a 4-way, 15° tilt. The overarm is especially suited for needle-type files, as the tension can be readily varied to meet operating requirements.

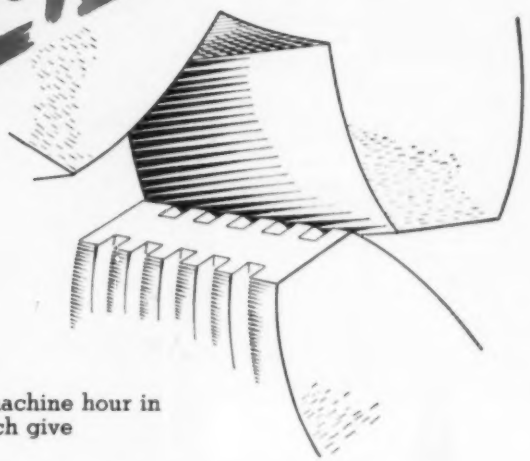
The chuck beneath the table has been changed from the rigid to the ball-jointed type to permit alignment of files with warped or crooked shanks with the workpiece. Two operating speeds are provided, one 300 and the other 400 strokes per min.

Rice Pump & Machinery Co., Milwaukee 15, Wis.

(MORE DATA? CIRCLE FYI 46, p. 157)



Accent on production



When it comes to real productivity per machine hour in gear production, the two techniques which give you the "mostest for the leastest" are:

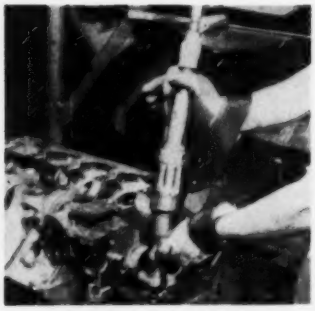
1 Shear-Speed gear cutting. In which all teeth are cut simultaneously in a fraction of the time required by other cutting methods. Applicable to internal and external spur gears and splines (involute and other shapes)—also to other toothed-form parts, regular or irregular. (Some helicals, also, but not all.)

2 Underpass gear-finishing in which a single "pass" of the cutter forward and back finishes a gear to the highest precision. (For very wide gears, traverpass or transverse shaving can be used on the SAME MACHINE—if it's a "Michigan".) Underpass shaving is available for spur and helical gears and splines from ¼ in. to many feet in diameter.

To produce more gears per hour "for less"—in mass production or job lots—you can't beat a "Michigan-tooled" line.

COMPLETE from blank to finished gear EQUIPMENT

MICHIGAN TOOL COMPANY 7171 E. McNichols Road Detroit 12, U.S.A.



Nut Setters Have Angle Heads For Close Work

Two models of nut setters, 16C-43 and 16C-46, are designed with 12:1 gearing in the gear case which, coupled with 1:1 and 2:1 gearing respectively in the angle attachments, provides torques of 30- and 60-ft. lb. The small, compact angle heads adapt the tools to fast work in close quarters.

Standard double-end or built-in angle heads are also available. The attachments are completely interchangeable with the gear case.

Keller Tool Co., Grand Haven, Mich.
(MORE DATA? CIRCLE FYI 47, p. 157)

Starrett Test Indicator Has Greater Versatility

A swivel friction-holder on the end of the body of this test indicator permits using it in the chuck of jig borers, milling machines, or boring machines. By means of the ball swivel joint, the indicator is adjustable to sweep any hole or other surface within its range.

A universal shank can be attached to the end of the holder allowing the indicator to be used on 18- and 24-in. vernier height gages, on lathes in the toolpost holder, and other applications. Other attachments available include extension arms and couplings, a body clamp, surface gage attachment, and three different sizes of contact points.

L. S. Starrett Co., Athol, Mass.
(MORE DATA? CIRCLE FYI 48, p. 157)

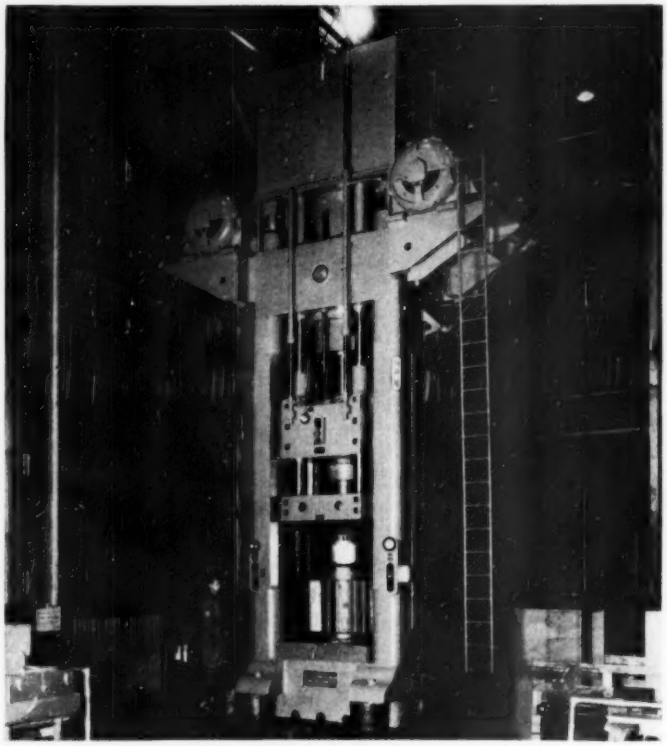
Three-Way Fire Nozzle Gives Two Spray Patterns

Known as the G-5 fire nozzle, this unit can be changed from full fog to straight stream to complete shut-off by a turn of the handle. Revolving the handle moves a pin in the spiral tip, permitting more or less water to form the patterns.

It produces a full-cone spray pattern with an inner cone that provides safety for the operator as it eliminates air pockets. The outer cone is a fine fog that extinguishes the fire with a minimum of water.

The nozzle can be operated at any pressure from 30 to 150 lb, using at 100 lb pressure about 8 gpm for fog and 10 gpm for straight stream. Price —$16.60.

Bete Fog Nozzle, Inc., Greenfield, Mass.
(MORE DATA? CIRCLE FYI 49, p. 157)



Hydraulic Sheet-Metal Press Draws Parts 36-In. Deep

Mass production of heavy-gage steel parts is said to be possible with this 750/500-ton sheet-metal drawing press. The press is equipped with a 250-ton blank holder and a 200-ton hydraulic die cushion with a 36-in. stroke. The die-cushion platen measures 47 x 47 in. The press will draw and lift out a part 36 in. deep.

Some features: adjustable blank holder pressure at each of the four corners of the slide; rapid advance to work with automatic slow-down as die contacts work; automatic press reversal.

Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
(MORE DATA? CIRCLE FYI 50, p. 157)

REVERE Free Cutting Brass Rod Makes "Duck Soup" out of Deep Recesses!

ANYONE who has set-up a lathe or tooled-up an automatic can see at a glance that the Eastman Pressed-On Hose Coupling is not the easiest thing in the world to machine from the solid.

On one end the boring, chamfering, deep turning to a pipe thread taper up to a round shoulder, and threading, are neither very difficult nor very easy to handle.

But look at that deep recess on the other end! It has reverse under-cut annular serrations that are so clean and accurate that the coupling holds a hydraulic hose with a grip that is stronger than the hose itself.

Anyone who had to do that job would want to work on a material which had all the ease of machining and uniformity of behavior under the cutting tools he could get. That is why the Eastman Manufacturing Company, Manitowoc, Wisconsin, uses $1\frac{5}{16}$" diameter Revere Hexagon Free Cutting Brass Rod in this patented coupling. All of the production problems are in the tools, none are in the material.

The difficult tasks are not the only ones on which the ultimate of machinability will pay off. If you want to work to combinations of speeds and feeds and accuracies which are even a little bit beyond the ordinary, or you have a job which is even a minor challenge to your tool makers and your set-up men, then Revere Free Cutting Brass Rod may be your best friend.

It will not cost anything to find out. Just get in touch with your nearest Revere Sales Office.

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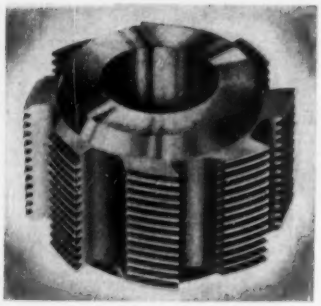


Tool-Graph Chart Supplied With Illinois Fine-Pitch Hobs

These hobs are used to cut 20-diametral-pitch gears and finer. The hobs are to be used for manufacturing small gears in clocks, instruments, timers, and small mechanisms of all types.

A tool-graph chart which accompanies each hob shipped, shows the variation in the lead of each hob. The need for difficult fine-pitch-hob lead inspection is said to be eliminated.

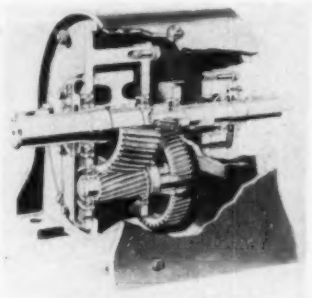
Illinois Tool Works, 2501 N. Keeler Ave., Chicago 39, Ill.
(MORE DATA? CIRCLE FYI 51, p. 157)

Close Couplers Automatically Lock Trailers

Fifth-wheel trailers made by Market Forge have a close-coupling feature that automatically links the trailers 18-in. apart. A locking device keeps the fifth wheel in line and prevents jackknifing when the trailer train backs up.

A 10-in. stainless-steel disk is used in the fifth-wheel bearing, and the turntable and king bolt are pressure lubricated. The trailer uses rubber wheels, and the axles are removable. Specifications are: capacity 6,000; 36 in. wide x 72 in. long; height of deck from floor 12¾ in.; wheel base 30 in.; and minimum turning radius 62 in.

Market Forge Co., Everett, Mass.
(MORE DATA? CIRCLE FYI 52, p. 157)



Concentric-Shaft Speed Reducer Has All-Steel Housing

The all-steel housing design on this concentric shaft speed reducer is said to provide more rigidity, greater strength, and improved appearance. Mechanical efficiency is said to be 96 to 98½% at full load and constant during life of gears.

Output speeds range from 1 to 1170 rpm; imput speeds up to 1750 and higher if necessary. Speed ratio is from a minimum of 1.5 to 1 to a maximum of 970 to 1. Horsepower range is from 1 to 50. Horizontal or vertical right-angle speed reducers are also available.

Falk Corporation, Milwaukee 8, Wis.
(MORE DATA? CIRCLE FYI 54, p. 157)

Zero-Max Torque Converter For Fractional-Hp Motors

This Zero-Max torque converter has a rating of 20 in. lb, provides full torque conversion at all speeds and infinitely variable speeds from zero to ¼ the input motor speed. According to the manufacturer, the full torque conversion feature of the unit makes possible the use of smaller, lower-cost, single-speed electric motors.

The overall dimensions of the model are 5-in. long, 3½-in. high, and 4-in. deep. Weight with case is 3¾ lb. Price—$34.95.

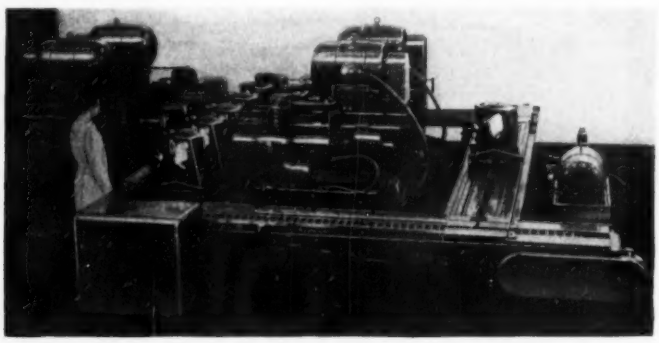
Revco Inc., Dept. AM., 405 Thorpe Bldg., Minneapolis 2, Minn.
(MORE DATA? CIRCLE FYI 55, p. 157)

Electric Panel Meters, hermetically sealed, are available in the 4½-in. size. A solder-type zero adjuster provides adjustment without breaking the hermetic seal. Rubber gasket is included for use as a pressure seal for panel mounting. Either 1 per cent or two per cent accuracy rating is available.

Marion Electrical Instrument Co., Manchester, N. H.
(MORE DATA? CIRCLE FYI 56, p. 157)

Solenoid valve for oil burners features a soft synthetic seat and seals to prevent leakage; spring loading for positive closing; sturdy steel construction; no brazed, welded or soldered pressure joints; all parts plated to resist corrosion, and a weight of 9 oz. It is a two-way normally closed valve with a maximum pressure rating of 125 psi.

Skinner Electric Valve Div., The Skinner Chuck Co., Norwalk, Conn.
(MORE DATA? CIRCLE FYI 57, p. 157)



DRILLING and boring of aircraft cylinder heads is accomplished by this Transfermatic—manufacturer's name for its machine tools equipped with automatic-transfer mechanisms. The machine drills the valve guide holes and rough-forms the valve pockets and spring compartments. In a second operation, it finish-bores the valve guide holes, inserts seats and spring sets. Stub tools are used for drilling and forming, eliminating the necessity for tool guide bushings. One operator completes 80 pph at 100% efficiency. Coolant is directed through the spindles. —*Cross Co., Detroit 7, Mich.* (MORE DATA? CIRCLE FYI 53, p. 157)

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NEW BULLETINS

MACHINERY AND ATTACHMENTS

1 GRINDERS—*Thompson Grinder Co., Springfield, Ohio.* 31-page catalog describes metallic surface, heavy duty, toolroom, contour, and broach grinders. Included are photographs and specification tables.

2 PRESS BRAKES—*Airtherm Mfg. Co., St. Louis 10, Mo.* 12-page booklet 904 covers the firm's complete line of Metalworker power press brakes. The brakes feature long-wearing dies made of chrome molybdenum steel.

3 ROLL GRINDERS—*Farrell-Birmingham Co., Inc., Ansonia, Conn.* 16-page bulletin 118 describes with illustrations a two-wheel calender-roll grinder that features added accuracy in its swing-rest principle.

4 VIBRATING FEEDER — *Hewitt-Robins Inc., New York 17, N. Y.* 4-page bulletin 134 describes a fully mechanical vibrating feeder which features low initial and maintenance costs, simple feed control.

5 BORER—*DeVlieg Machine Co., Detroit, Mich.* 20-page catalog describes the Jigmil, a precision boring and milling machine that does a rapid job on repetitive work without fixed, inflexible jigs. Hole sizes may be controlled to 0.0001 in.

TOOLS AND ACCESSORIES

6 GRINDING METHODS—*Behr-Manning, Troy, N. Y.* 8-page brochure discusses firm's methods and equipment demonstration rooms, where lab pretesting is possible under simulated production conditions. 10 case histories are listed, showing specific successes in these proving grounds.

7 AIR CHUCKS—*Union Mfg. Co., New Britain, Conn.* 12-page Bulletin 40 describes standard and adjustable jaw chucks, and includes specifications for rotating air cylinders. Also covered are air control, pressure regulating, and treadle valves.

8 HUB WHEEL—*Norton Co., Worcester 6, Mass.* Folder illustrates and de-

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scribes all-purpose grinding wheel for roughing, finishing, or notching. Reinforced resinoid construction gives longer life to the wheel.

9 WHEELS AND POINTS—*Bay State Abrasive Products Co., Westboro, Mass.* 4-page folder describes firm's line of mounted wheels and points, made in different bonds for a variety of jobs. Even mixture of abrasive and bond eliminates hard and soft spots.

10 COLLETS—*Balas Collet Mfg. Co., Cleveland 14, Ohio.* Catalog illustrates and describes the firm's complete line of collets, pushers, pads, and other machine tool accessories. Suggestions for practical application of the tools are included.

11 BRAKE DIES—*Service Machine Co., Inc., Elizabeth 4, N. J.* 4-page folder discusses the firm's step-by-step method of making brake dies, including the making of small try-out sections, by means of which any practical size or shape can be made.

12 IMPULSE TIMERS — *Zenith Electric Co., Chicago, Ill.* 4-page bulletin describes gearless, clutchless impulse timers. Timer provides impulse circuit for production line control and other applications.

HEAT-TREATING AND WELDING

13 CRANKSHAFTS — *Ajax Electric Co., Inc., Philadelphia 23, Pa.* Reprinted article by Joseph J. Ebner, Evinrude Motors, Milwaukee, deals with a carburizing-martempering procedure that streamlines crankshaft heat-treating.

14 RECTIFIER WELDER—*Westinghouse Electric Corp., Pittsburgh 30, Pa.* 8-page bulletin 26-100 describes the firm's new dc welder, a 3-phase rectifier type. Combines the economic advantages of the single-phase ac welder with the benefits of the rotating dc welder.

15 HEATED RUBBER—*B. F. Goodrich Co., Akron, Ohio.* Information bulletin discusses embedded wire-resistor type of electrically heated rubber. Using question-answer technique, the bulletin highlights attractive features of rubber, and amount of power to be used.

16 WELDED CONTAINER — *The Dravo Corp., Pittsburgh, Pa.* 4-page folder with photographs deals with the Dravo Transportainer and how this cargo carrier is buttressed inexpensively through the use of spot welding.

PLANT SERVICE EQUIPMENT

17 PUMP — *Alemite Versatal Spray Pump Equipment, Div. of Stewart-Warner Corp., Chicago, Ill.* 14-page booklet illustrates and describes the uses of the firm's new Versatal pump. The piston is operated by air-powered motor.

18 TRAVELING CRANES — *Northern Engineering Works, Detroit 7, Mich.* 8-page illustrated booklet G-700 shows a wide range of uses for the firm's overhead electric traveling cranes in steel mills, power plants, tool and die shops, and foundries.

19 WATER SOFTENERS—*Cochrane Corp., Philadelphia 32, Pa.* 4-page folder discusses zeolite water softeners to be used where less than 100 gpm are required. Features are simplicity of operation, and low initial and chemical cost.

20 TRANSFORMERS—*United Transformer Co., New York 13, N. Y.* 28-page illustrated catalog 500 lists with descriptions the complete UTC line of transformers, reactors, and filters. Applications, specifications, and charts are included.

21 GENERATORS — *General Electric Co., Schenectady 5, N. Y.* 8-page bulletin discusses Tri-Clad high-speed synchronous generators for standby, portable, and prime-source power.

PARTS AND MATERIALS

22 SOLENOID VALVES—*The Johnson Corp., Three Rivers, Mich.* 8-page catalog with descriptive diagrams and tables covers a line of direct-operated solenoid valves. Valves may be used for automatic or remote control of liquids and steam up to 400 F, and for high-viscosity liquids.

23 SPEED REDUCER — *De Laval Steam Turbine Co., Trenton 2, N. J.* 32-page bulletin covers firm's worm-gear speed reducers, highlighting their durability, ease of maintenance and smooth power flow.

24 OIL SEALS—*Johns-Manville, New York 16, N. Y.* 16-page illustrated handbook describes the firm's versatile, almost fracture-proof Clipper seals. The 5-model line resists corrosion, fits a wide range of shaft diameters, and can be employed for high temperatures or low pressures.

25 GEAR COUPLING—*Sier-Bath Gear & Pump Co., North Bergen, N. J.* 4-page folder explains the simplified 7-part construction of the firm's coupling and illustrates size and weight advantages by comparison with other gear types.

26 THERMOCOUPLES—*Thermo Electric Co., Inc., Fair Lawn, N. J.* 8-page section of firm's latest catalog deals with industrial thermocouples; includes tables listing sizes and assembly specifications.

27 RADIOGRAPHY—*Eastman Kodak Co., Rochester, N. Y.* 16-page catalog on materials for industrial radiography describes films for use with X-ray equipment of varying kilovoltage and with specimens of varying thickness and density.

28 MICROSCOPES—*Bausch & Lomb Optical Co., Rochester 2, N. Y.* 19-page catalog describes new Series E line of research microscopes which emphasize adjustability and accuracy.

MISCELLANEOUS

29 ROCKER SHOVEL — *The Eimco Corp., Salt Lake City 8, Utah.* 4-page folder with color illustrations describes sand and gravel rocker shovel, which can be used for bulldozing, carrying, or loading.

30 VIBRATORS—*The Cleveland Vibrator Co., Cleveland 13, Ohio.* 12-page catalog 105 covers firm's line of pneumatic vibrators, as well as valves and fittings. Includes price list and specifications.

NEW 14"
South Bend
Economy Model
DRILL PRESS

$76.00
f.o.b. factory
less
motor and chuck

RUGGEDLY CONSTRUCTED FOR MACHINE SHOP SERVICE

Write for Bulletin 402

Features include automatic belt tension, direct reading depth stop, full tilting table, rigid one-piece head casting, free-floating six-spline spindle, four pre-lubricated precision ball bearings, and adjustable feed tension.

Specifications: Drills to center of 14-1/4" circle, maximum drill size 1/2" in steel, spindle run out .005" or less, spindle square to table within .0075" in 5". Net weight of bench model shown, less motor and chuck is 124 lbs.

SOUTH BEND LATHE
SOUTH BEND 22, INDIANA
Building Better Tools Since 1906

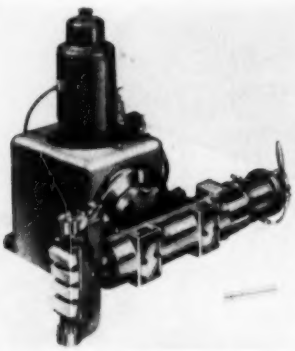
Overload Device on Press Attaches to Tie Rod

An overload safety unit called Loadtrol is applied to the bottom end of each tie rod of Clearing presses. It consists of an air cylinder connected by a lever arm through an eccentric-pin arrangement in such a way that the tie rod moves a short distance when a predetermined pressure is exceeded. This movement also disengages the clutch by means of an electrical control.

The unit makes it possible to preload the tie rods cold in a matter of minutes. Since the yielding pressure can be adjusted as required, tryouts and settings of dies are simplified.

A modification of the same device is offered for protecting the links on the outer slide of a double-action press. When so specified, Clearing presses now in manufacture will include this device.

Clearing Machine Corp., 4699 W. 65th St., Chicago 38, Ill.
(MORE DATA? CIRCLE FYI 72, p. 157)



Gisholt Superfinish Attachment For Heavy-Duty Work

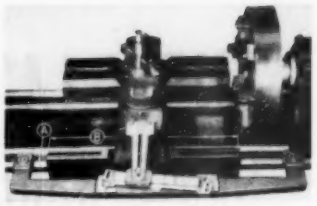
Gisholt No. 4 is a heavy-duty attachment to be used for either cylindrical or flat work wherever large areas are to be covered. The unit is to be mounted on an engine lathe or other suitable equipment now in the user's shop. As the attachment is traversed along the work, the superfinishing stones contact the surface and scrub away the amorphous metal. Working time is longer when the surface has not been previously ground.

This attachment can give up to 1000 psi pressure with an adjustable oscillation rate of from 42 to 250 spm. One to 4 stones up to 1 x 1 x 6 in. can be mounted in the stoneholder.

Gisholt Machine Co., Madison 10, Wis.
(MORE DATA? CIRCLE FYI 73, p. 157)

Broaches have a higher finish on the cutting rake due to a process called Dymon-Ize sharpening. It is said to reduce the height of the minute tool marks at the cutting edges of the broach teeth. Smoother chip flow while the chip is being curled up in the chip space is said to result from this development.

Colonial Broach Co., Box 37, Harper Station, Detroit 13.
(MORE DATA? CIRCLE FYI 74, p. 157)



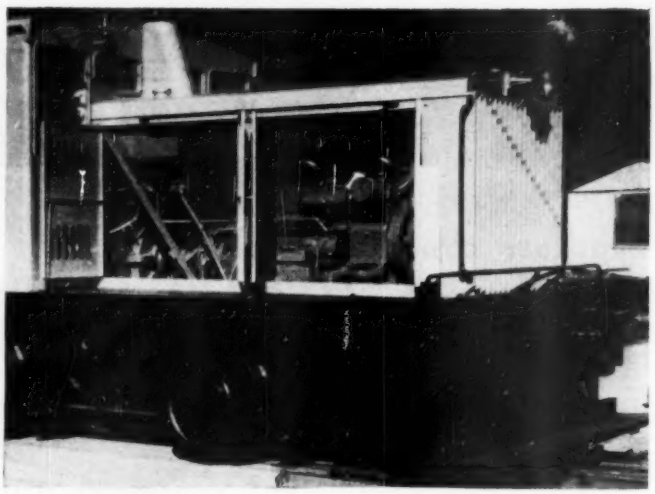
Lathe Attachment Will Produce a 20° Taper

This heavy-duty taper attachment is suitable for lathes having a swing up to 36 in. It will cut a 12-in.-long taper of 20° (4 ipf approx.) at one setting.

The sliding fixture has a long bearing surface with gibs to compensate for continuous usage. The swivel bar has V-ways with the ends graduated, one in degrees, the other in ipf.

Smaller-size master taper attachment for bench lathes have a capacity of 16½° or 3½ ipf and 7½-in. longitudinally.

Master Taper Co., 4531 N. Beacon St., Chicago 40, Ill.
(MORE DATA? CIRCLE FYI 75, p. 157)

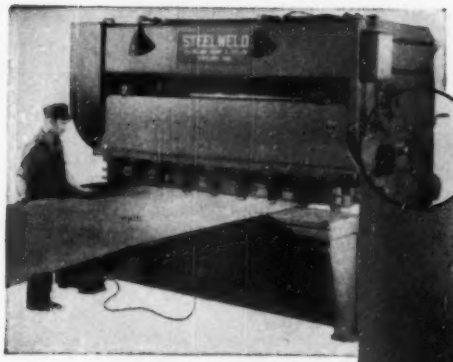


Torque Converters Installed in Shop Locomotives

Hydraulic torque-converter locomotives are being built by Plymouth Locomotive. Installed between the engine and the final drive, there is no rigid or mechanical connection between the driving and the driven parts, the power being transmitted entirely through a fluid mass.

Torque converter advantages are said to be: all shocks and vibrations greatly reduced; engine cannot be lugged down or stalled; torque multiplied up to five times at stall; variable reduction ratio automatically adjusts to load, and more work per time because of the uninterrupted acceleration.

Plymouth Locomotive Works, Div., Fate-Root-Heath Co., Plymouth, Ohio.
(MORE DATA? CIRCLE FYI 76, p. 157)



THE *Right* KNIFE CLEARANCE FOR EVERY PLATE THICKNESS

ONLY STEELWELD SHEARS HAVE THIS SIMPLE KNIFE ADJUSTMENT

It is simple, fast and easy to adjust the knife clearance on a Steelweld Pivoted-Blade Shear to suit every plate thickness. No bolts to loosen! No bed to move! No feeler gauges required!

Only turn a crank and watch a dial. That's all there is to it. The large easily-read dial indicates the clearance between knives in thousandths of an inch and also shows the plate thickness that may be cut with any knife setting. Because of the ease with which knife adjustments are made, every cut made on Steelweld Shears is the best cut possible—straight, smooth, accurate. And of importance, knives remain sharper for longer periods.

Steelweld Shears are built for thicknesses of 12 gauge to 1¼ inch and for lengths of 6 to 18 feet.

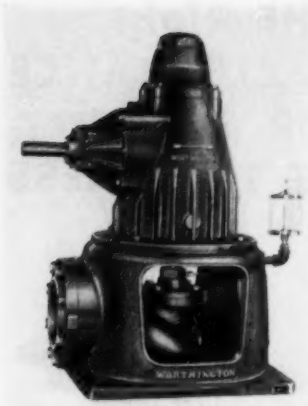
GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

1411 EAST 282nd STREET, WICKLIFFE, OHIO

STEELWELD PIVOTED BLADE SHEARS



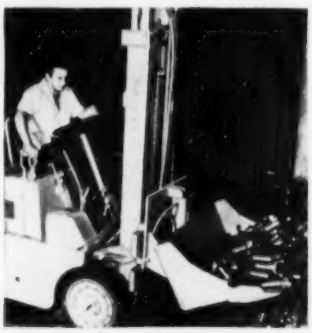
Large-Size Bearings Put in Vertical Turbine Pumps

Vertical turbine pumps developed by Worthington have these features: Extra-size bearings of special material for long life, shaft seals where required, enclosed impellers throughout, wearing rings, flanged and bolted bowl construction.

Either oil- or water-lubricated pumps are available from various stock locations, arranged for motor drive, right-angle gear drive, or belt drive. Capacities from 50 to 15,000 gpm are available.

Vertical Turbine Pump Div., Worthington Pump and Machinery Corp., Harrison, N. J.

(MORE DATA? CIRCLE FYI 77, p. 157)



Fork-Shovel Attachment Speeds Handling of Forgings

A heavy-duty fork-shovel attachment for lift trucks, with 7¾-in.-long tines, is said to be saving a great deal of time in the handling of many loose materials such as castings.

The hydraulically controlled shovel can be tilted up to 40° above horizontal, including 10° tilt of the upright assembly, which permits it to scoop up maximum loads without having to ram the stockpile. The backward tilt assures security of loads during transportation.

Actuated by an auxiliary valve, the fork-shovel manipulation has no effect on the lifting operation, nor on tilting of the uprights. The attachment is readily interchangeable with many others, and with standard forks available for use on Clark fork lifts. Dumping angle is 48° including 3° of forward tilt.

Clark Equipment Co., Industrial Truck Div., Battle Creek, Mich.

(MORE DATA? CIRCLE FYI 78, p. 157)

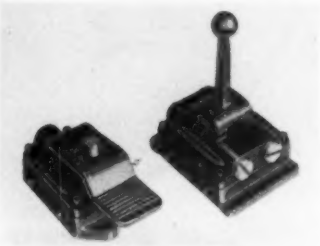
Cut-Off Wheels Bonded With Nylon Fibers

Resinoid bonds reinforced with strong nylon fibers feature the construction of these Saf-T-Cut rough-sided wheels. The wheels are said to withstand unusual abuse and render fast cutting action.

Applications where disk wheels are used are in cutting gates and risers on castings, slotting track welds, slicing transite, and cutting firebrick.

Bay State Abrasive Products Co., Westboro, Mass.

(MORE DATA? CIRCLE FYI 79, p. 157)



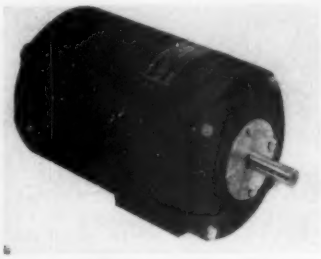
Parts are Interchangeable In Ross Air Valve

Chief feature of this Ross air valve is its flexibility due to interchangeability of parts. It can be supplied with a vertical handle, with vertical handle with spring return, horizontal handle, horizontal handle with spring return, double-treadle foot lever, or single-treadle foot lever with spring return.

For use in the control of air cylinders, the valve is available in three-way or four-way models, with ¼- and ⅜-in. pipe sizes.

Ross Operating Valve Co., 120 East Golden Gate Ave., Detroit 3, Mich.

(MORE DATA? CIRCLE FYI 80, p. 157)



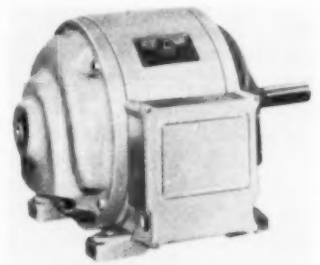
High-Starting Torque Features Fractional-Horsepower Motor

This brush-type universal motor of ⅛ to ¼ hp was designed for use where high-starting torque and large output power at high speed is required.

Full-load speed is 7,500 rpm. No-load speed—18,000 rpm. The shaft is 1-in. long and has a ⅜-in. diameter. The motor requires 115 volts standard ac or dc and will operate on 25, 50, and 60 cycle ac.

Howard Industries, Inc., Racine, Wis.

(MORE DATA? CIRCLE FYI 81, p. 157)



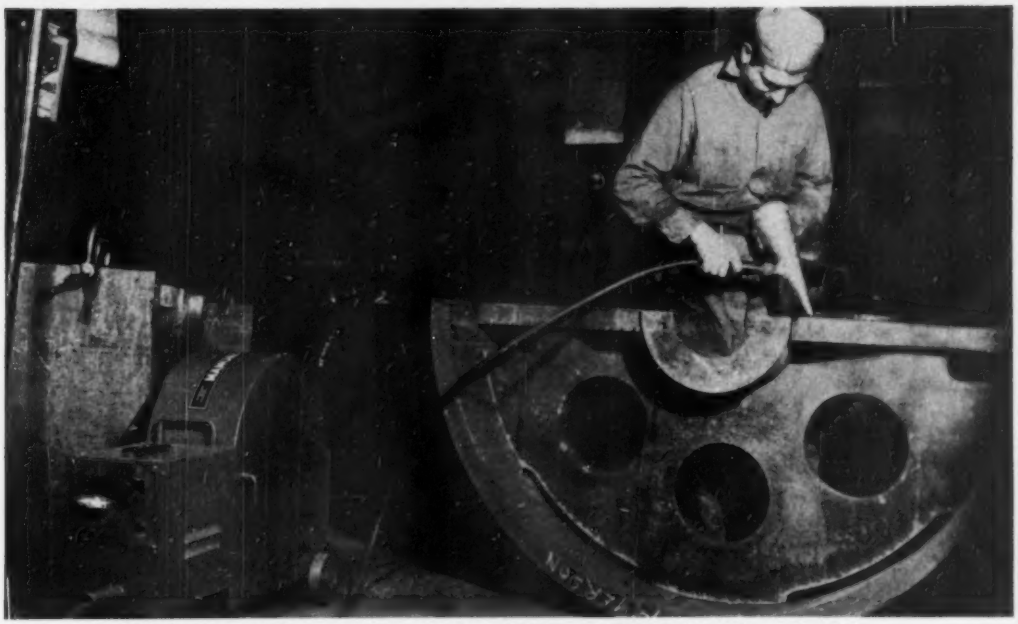
Single-Phase Capacitor Motors Added to Drip-Proof Line

Single-phase capacitor motors have been added to the line of Sterling drip-proof motors. They may be side-wall mounted, inverted ceiling mounted, or floor mounted, and still retain the drip-proof feature by simply rotating the end bells so that the air-vents point downward.

The starting relay eliminates the necessity of centrifugal switches or any rotating devices.

Sterling Electric Motors, Inc., Los Angeles, Calif.

(MORE DATA? CIRCLE FYI 82, p. 157)



Whether you fabricate machinery, tanks, containers or structural members, Lincoln's

NEW High-Current-Density

HIDDEN-ARC WELDING PROCESS

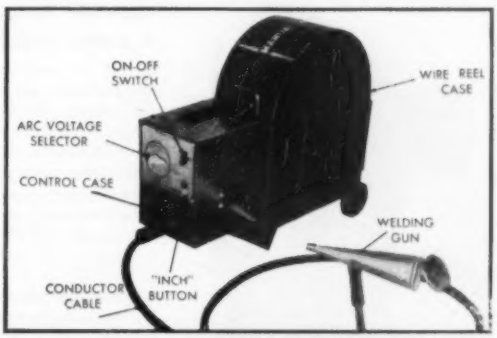
can cut your welding costs

Here's the latest, most important development in faster, easier, lower-cost arc welding... Lincoln's exclusive High-Current-Density, Hidden-Arc Welding Process. Through the use of current densities up to 600 amps. on ¼" diameter continuous welding wire (equivalent to 9600 amps. on a ⅝" rod!) you get welding speeds up to 360 inches per minute . . . *3 to 4 times that possible with conventional hand welding.*

Now with the new "Manual Lincolnweld ML-2" the effective cost-cutting benefits of deeper penetration and higher-quality welding in granular flux are further extended to an even wider range of work. With its compact, portable design, the new "Manual Lincolnweld" can be speedily moved to any part of the shop to simplify welding on all flat or near-flat work. It operates from any Lincoln 600 or 900 amp. "Shield-Arc" motor driven or 600 amp. engine driven arc welder, further making it easy to move about the shop especially in confined areas.

For additional flexibility, the welding gun, which uses either ¾" or ⅝" wire, can be hand-held or mounted in a simple fixture. The unit can be set also for either "Manual Lincolnwelding" or normal hand welding with coated electrodes.

The High-Current-Density, Hidden-Arc Welding Process is an exclusive process of The Lincoln Electric Company, Cleveland, Ohio.



New "ML-2 Manual Lincolnweld" Weight without wire reel only 121 pounds. The control case alone weighs only 50 pounds and can be detached from wire reel case for additional portability in restricted spaces.

GET THE FACTS

Send for free "Manual Lincolnweld" Bulletin 1303, write

THE LINCOLN ELECTRIC COMPANY

Dept. 107, Cleveland 1, Ohio

Sales Offices and Field Service Shops In All Principal Cities

LINCOLN

Plug-In Control Center Handles Six Starters

Up to six, size-1 or -2 starters for this control center can be mounted in a vertical section 20-in. wide by 20-in. deep by 90-in. high.

The plug-in units have positive-pressure stabs which grip vertical busses. The door handles provide for as many as four padlocks to lock both doors and disconnect in either on or off position. On closing, the handle moves to indicate true position of disconnect. Circuit breakers are Type ML thermal magnetic with trip-free, non-tamperable, factory-calibrated protection. Switches have a visible blade, quick make-and-break design.

Square D Co., 4041 North Richards St., Milwaukee 12, Wis.

(MORE DATA? CIRCLE FYI 83, p. 157)

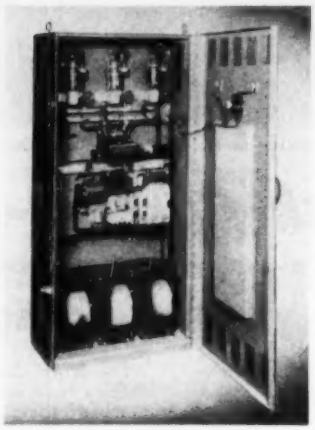
Increased Die Capacity Put in 4-Ton Punch Press

Increased tooling height has been added to the 4-ton Benchmaster punch press. Where open height, ram up, was formerly 6¾ in., this model now possesses a full 8 in. The manufacturer claims this to be the largest vertical working dimension of any small press.

This additional height is valuable for adapting special tooling, for easing set-ups, and for permitting use of dies and die sets heretofore too large for the standard model. Other improvements are: heavy - duty clutch dog made of a shock-resisting steel; clutch linkage doubled in thickness for greater strength and rigidity; clutch wedge redesigned to incorporate a "safety-stop" solid block. Heavy-duty cast-aluminum flywheel guards for the full line of 1-ton, 4-ton, and 7½-ton presses are available from the manufacturer.

Benchmaster Mfg. Co., 2952 West Pico Blvd., Los Angeles 6, Calif.

(MORE DATA? CIRCLE FYI 84, p. 157)



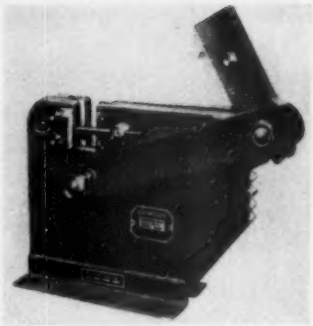
Electronic Rectifier Is Easily Installed

Floor- or wall-mounted electronic-rectifier units are mounted in factory-assembled inclosures to simplify installation, and to facilitate inspection and maintenance. Electronic tubes and other components are rated conservatively for safety and increased operating life. Separate compensating adjustments for filament voltages are incorporated in all models.

Standard units can be supplied with constant or adjustable dc output voltages, in ratings as high as 230 volts, 87 amp. The adjustable-voltage units provide a range of from 60 to 100% of rated-output voltage. They are designed for operation from 115/230, or 230/460 volts, single or three phase.

Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

(MORE DATA? CIRCLE FYI 85, p. 157)



Knives Located At Top of Bar Cutter

The knives are located at the top of the Samson hand-lever bar cutter; a location which is said to be convenient because a number of bars may be laid down on top of the machine and then dropped into the opening one by one.

Steel-plate frame is said to be unbreakable. The cutters will take any size rod from 1/16 of an inch up to their rated capacity without changing knives. It is available in two sizes: No. 50/23 cuts rounds up to ⅞ in., squares up to ¾ in., flats up to 7/16 in. x 2½ in. No. 50/26 cuts rounds up to 1 in., squares up to ⅞ in., and flats up to ½ in. x 3 in.

Julius Blum & Co. Inc., 532-540 W. 22nd St., New York 11, N. Y.

(MORE DATA? CIRCLE FYI 86, p. 157)

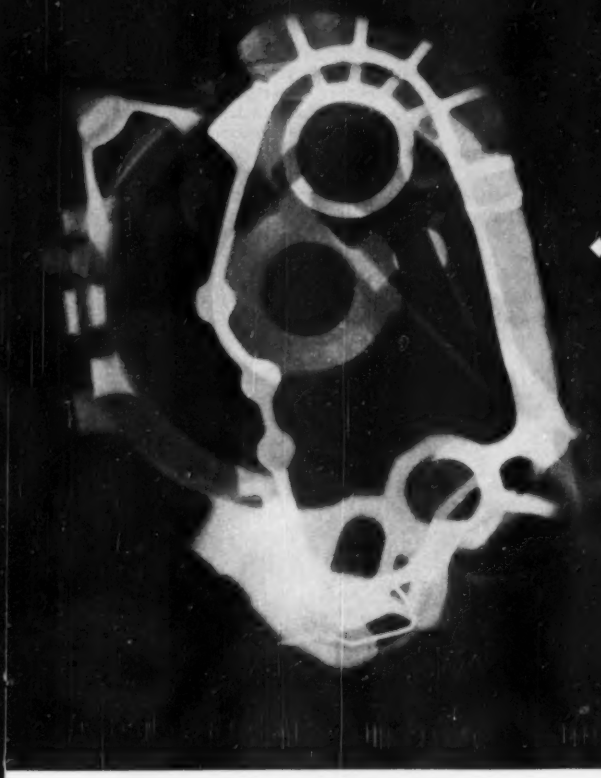
Air-Mite Adds Vertical Model To Micro-Cylinder Line

A threaded nose with a jam-nut lock for underneath jig installations is featured in this vertical micro air-cylinder line. Despite its small size, it delivers 75-lb thrust on a 100-lb line pressure.

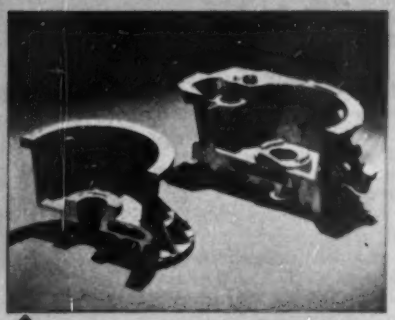
The stroke is ⅝ in., with equal ram pressure at any stroke point. Cylinders are machined from solid-brass bar stock.

Air-Mite 2651 W. Lake St., Chicago 12, Ill.

(MORE DATA? CIRCLE FYI 87, p. 157)



Radiograph showing how the oil passage walls could be checked without damage to the casting.



Cutaway showing oil passage which required accurate and uniformly thick walls.

Only Radiography could check this vital specification

THIS sand cast aluminum housing for a high-altitude air pump included passages to carry oil at very high pressures. Specifications called for passage walls of accurate and uniform thickness.

There was one way to check this important specification—one sure way for the foundry to be absolutely certain of releasing only sound and satisfactory castings. Radiographic inspection was the way.

Radiography is becoming more and more routine with foundries assigned important tasks. On critical castings, such as this, it may be used to assure freedom from core shifts immediately before pouring and as a final casting inspection tool. Most valuable of all, radiography reveals internal defects during the pilot casting stage and suggests the changes needed to assure high yield in the production run.

Ask your X-ray dealer to explain the many ways radiography can increase your yield and better your foundry operations.

EASTMAN KODAK COMPANY

X-ray Division • Rochester 4, N. Y.

Radiography...

another function of Photography

Kodak

TRADE-MARK

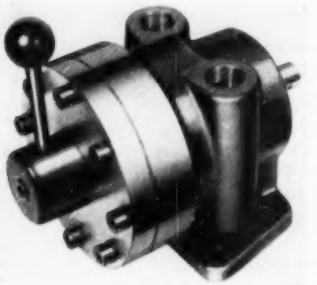
Compact Bench Grinder For Free-Hand Work

This vertical-spindle grinder, designated as No. 318-18 in., has an approximate weight of 575 lb., complete with its 18-in.-diameter abrasive wheel. 31-in. high and 28½-in.-wide over-all, its compact construction is featured as a major advantage.

As all grinding is done in a horizontal plane, easier handling is claimed as well as increased production and safer operation. Dressing of the abrasive disk is accomplished by removing a section in the guard rail and swinging the dresser arm across the face of the abrasive.

The grinder is designed around a Fairbanks-Morse axial air-gap motor. The three-phase, 60-cycle motor is totally enclosed, fan cooled and ball bearing; 5 hp at 1160 rpm. Cross arms, pedestal, motor-driven coolant pump, tank, and piping for wet grinding are included as optional equipment.

Charles H. Besly & Co., Beloit, Wis.
(MORE DATA? CIRCLE FYI 88, p. 157)



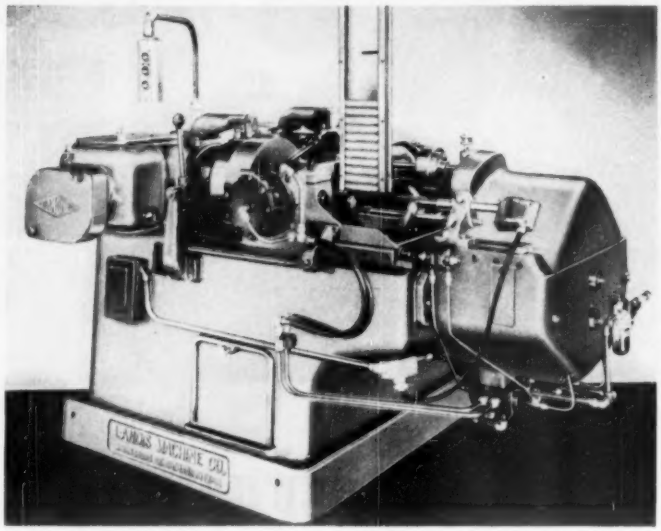
Vanes in Hydraulic Pump Provide Adjustable Displacement

The main purpose in the development of this pump was to provide controlled hydraulic power. Variable or adjustable displacement is provided by a vaned construction without resorting to heat-generating relief valves.

The pressure ring is free to rotate with the pump, the vanes moving back and forth in their respective slots by a substantially radial force—the tangential-force component is slight. This eliminates the high-velocity wiping action of the vanes over the inner bore of the ring and appreciably reduces friction and heating. The vanes are mounted radially as the pump is intended to be driven in either direction.

To simplify installation problems, a total of four pump connections are provided; two each for the intake and discharge. With this arrangement sixteen different connection combinations are possible on a standard Hydro-pump. It is available in foot-mounted, flange-mounted, and strip models. Capacities are from 0 to 10 gpm in either direction.

Hydropower, Inc., Milwaukee, Wis.
(MORE DATA? CIRCLE FYI 89, p. 157)



Automatic Nipple Threader Eliminates Manual Handling

These automatic nipple-threading machines are produced in two types, one for long and the other for close nipples. They thread, ream, and chamfer nipples in a continuous automatic operation, thus eliminating secondary manual handling.

Previously cut to the desired length, the nipple blanks are placed in a magazine on the left-hand carriage. After being released automatically from the magazine by the backward movement of the carriage, the nipple blank is pushed into position in the grips, following which the air-operated vise closes to hold the blank in position for the initial threading, chamfering, and reaming operation. The left-hand carriage advances rapidly to the thread-starting position, and then assumes a feed rate of travel equal to the lead of the thread being cut. A cam controls the carriage movement.

After the threads have been cut, the die head and vise open automatically and the carriage returns to the loading position. A transfer mechanism using mechanical fingers removes the semi-finished nipple, turns it end for end, and places it in position on the work rest bar of the right-hand carriage.

Both the long and short machines can be furnished with auxiliary equipment for producing nipples of ½ and ¾ in. in pipe size on the same machine. Machines built for the 1-in. pipe size can be furnished with auxiliary equipment for machining nipples on all other pipe sizes ranging from 1¼ to 2 in. inclusive.

Landis Machine Co., Waynesboro, Pa.
(MORE DATA? CIRCLE FYI 90, p. 157)

The NEW MOTCH & MERRYWEATHER No. 00-G Circular Sawing Machine

No. 00-G automatic model has air-operated stock feed for standard lengths up to 24".

Insert jaws of desired angle permit precision cut-off of stock up to 45° angle.

NOW, for the first time on a circular sawing machine, you can do square and angular cutting up to 45° of ferrous or non-ferrous stock up to 3" round or square, *fast and accurately.* The rugged one-piece saw head is gravity fed; speed changes by pick-off gears. Automatic stock feed for high production; manual feed for smaller shops and tool rooms. Special fixtures for odd-shaped parts. *Let us figure how much we can save you* on that next difficult job.

Write today for Bulletin 00-G.

Manufactured by

THE MOTCH & MERRYWEATHER MACHINERY COMPANY
715 PENTON BUILDING • CLEVELAND 13, OHIO
Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines

PRODUCTION-WITH-ACCURACY MACHINES AND EQUIPMENT

South Bend Builds Low-Priced Drillpress

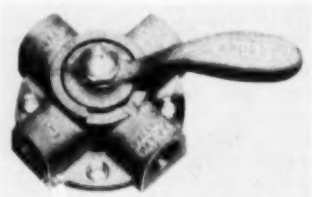
Known as the Economy Model, this 14-in. South Bend drillpress is available in both bench and floor models.

Features of the unit are: proper tension on the motor belt is maintained automatically. Spring tension helps to absorb shocks if drill should catch in the work. The head and table are equipped with double-plug locking binders which cannot change drillpress alignment when either assembly is locked or unlocked on the column.

Maximum drill size is ½ in. in steel. Spindle runout is 0.005 in., spindle square to table within 0.0075 in. in 5 in.

South Bend Lathe Works, South Bend 22, Ind.

(MORE DATA? CIRCLE FYI 91, p. 157)



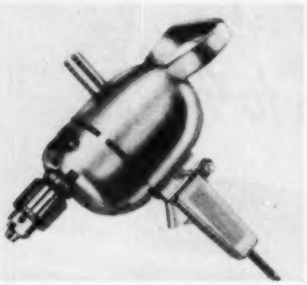
Sealing Surfaces Kept Clean In Manual 4-Way Air Valve

This manual four-way valve controls 150-psi air pressure and handles liquid pressures up to 100 psi. A tubular sealing member slides over the peripheral surface of a rotor, maintaining intimate contact during operation of the valve. The manufacturer claims that pipe scale and foreign material in the line cannot lodge between the sealing surfaces due to wiping action of the sliding seal.

Valve bodies are furnished in aluminum or brass, and the tubular sealing members are molded of various resilient materials. The controlled degree of softness allows a tight seal against the curvature of the mating surface.

Barksdale Valves, 4095 Santa Fe Ave., Los Angeles, Calif.

(MORE DATA? CIRCLE FYI 92, p. 157)



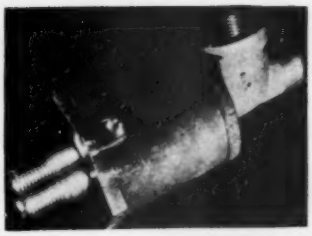
Portable Electric Drill Has Toggle Reversing Switch

This electric drill turns in reverse at a flick of the toggle switch, eliminating hand turning and struggling to remove the bit from wood.

Die-cast aluminum body weighs 8¼ lb. Drill capacity is ½ in. in metal, 1 in. in wood. The ac-dc 115-volt motor develops 550 rpm no-load speed.

Cummins Portable Tools, Div. Cummins Business Machines Corp., 4740 Ravenswood Ave., Chicago 40, Ill.

(MORE DATA? CIRCLE FYI 93, p. 157)



Rotary Joint Transfers Liquids To and From Revolving Drums

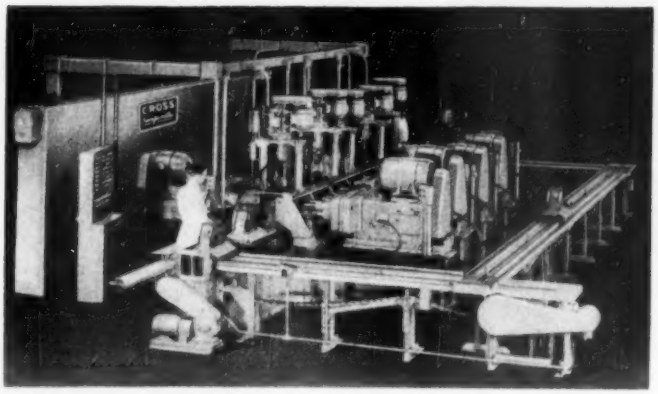
Liquids or steam may be transferred into or out of any revolving drum or roller by this rotary flexible joint.

The unit employs a rotating ball to transfer liquids through the hollow axle of a revolving drum or roll. This member is precision ground and lapped for sealing between the rotating member and the stationery inserts. Stuffing box has been eliminated by a spiral groove cut in the rotating member which acts like a pump and repulses any possible seepage between the surfaces. Expansion-type piston rings are fitted into the grooves of the bearing inserts. The swivel motion of the joint compensates for any misalignment.

Two models are available, the difference being that one model has a pipe connection at the end of the housing making contact with a siphon tube. Using the tube, one joint is able to add steam and withdraw condensate simultaneously.

The Phillips Rotary Joint & Valve Co. Inc., Hoboken, N. J.

(MORE DATA? CIRCLE FYI 94, p. 157)

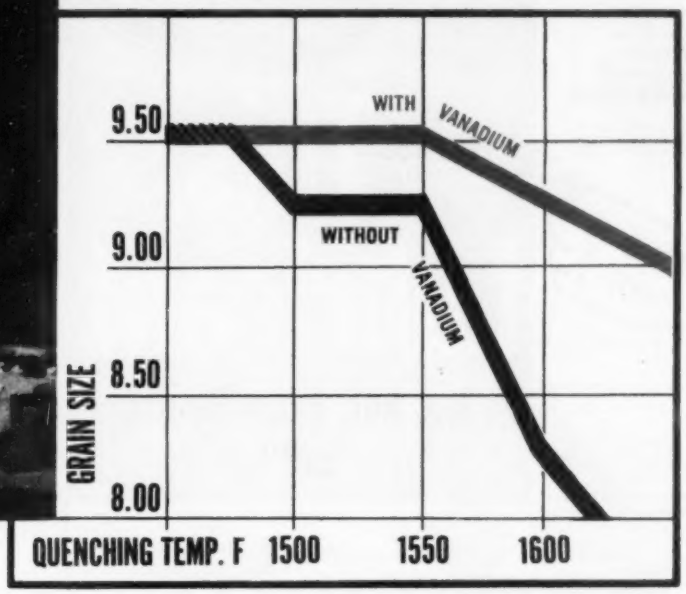


CROSS TRANSFER-MATIC drills, bores, and taps automatic-transmission extensions. It has 12 stations, including one for loading, ten for cutting, and one for unloading. Two-position progressive type, palletized work-holding fixtures are used. These carriers are automatically returned from the unloading to the loading station on an integral conveyor. A Toolometer stops work when tools need sharpening. Two operators finish 85 pph at 100% efficiency.—*Cross Co., Detroit 7, Mich.*

(MORE DATA? CIRCLE FYI 95, p. 157)

VANADIUM does big things for BTR TOOL STEEL

FINER GRAIN WITH VANADIUM! Here is graphic evidence of the grain refinement due solely to the vanadium addition. The finer grain improves shock-resistance, makes response to heat-treatment more foolproof.



BTR has the edge on oil-hardening, general-purpose tool steels which contain no vanadium. We've got conclusive proof that adding a little vanadium makes a whale of a difference!

Our laboratories have just concluded exhaustive tests in which BTR was put through its paces along with many other top grades of oil-hardening tool steel. Tests were conducted on all steels to compare such properties as: machinability, ease of hardenability, resistance to wear and shock, both maximum and annealed hardness and distortion in heat-treatment.

Accurate test data show that BTR retains a finer grain in hardening. BTR is less critical, more foolproof in heat-treating; it's less likely to develop cracks in quenching. It has greater shock-resistance, too. All of these characteristics are improved by the vanadium addition. That's why we have included this important alloying element in BTR's analysis for so many years.

Veteran toolmakers rely on BTR because it is **safe-hardening . . . easy to machine and heat-treat . . . and because it has good resistance to wear and shock . . . assures low distortion** in heat-treatment. It's useful in every toolroom for a wide variety of tools and dies. BTR is stocked by Bethlehem Tool Steel distributors everywhere. If you prefer, write us at Bethlehem, Pa.

Typical Analysis:	C	Mn	W	Cr	V
	0.90	1.20	0.50	0.50	0.20

(harden at 1475 F . . . quench in oil)

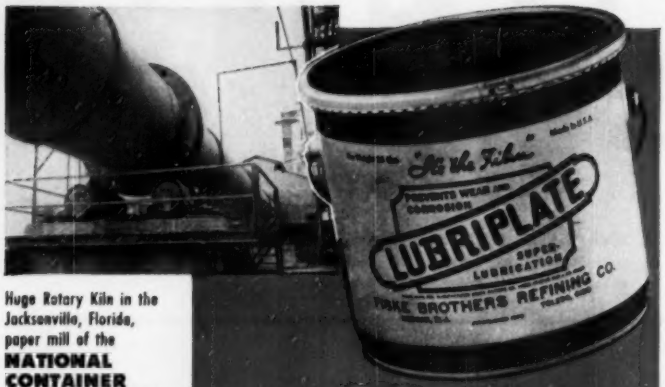
BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Bethlehem Tool Steel

ULTRASONIC TESTED



Huge Rotary Kiln in the Jacksonville, Florida, paper mill of the **NATIONAL CONTAINER CORPORATION**

they say:

"We use This Lubricant on big, hot, heavy bearings, too!"

Following is an extract from a lubrication report made by the plant engineer at the Jacksonville, Florida, Plant.

7' diameter by 300' long lime kiln, supported by five sets of trunnion rollers.

Temperature inside kiln at hot end is approximately 1800° F.

Kiln turns at approximately 1 RPM, trunnions turn at approximately 3 RPM on 7" journals in sleeve bearings lubricated by LUBRIPLATE No. 8.

Since changing to LUBRIPLATE No. 8 two years ago, wear on all bearings and journals has been reduced to a minimum, where formerly a definite problem of lubrication existed.

It is in these unusually severe applications where LUBRIPLATE Lubricants dramatically prove their outstanding qualities. Probably more seemingly impossible lubrication conditions have been satisfactorily met with LUBRIPLATE in the past twenty years than by any other group of lubricants.

In most instances, LUBRIPLATE Lubricants have been introduced to solve a difficult lubrication problem. Their performance is so remarkable that their use is extended throughout the plant. They definitely reduce friction and wear, prevent rust and corrosion and save power.

LUBRIPLATE Lubricants are available from the lightest fluids to the heaviest density greases . . . a product for every lubrication requirement. Let us send you case histories of their use and savings in your industry. Write today.

LUBRIPLATE DIVISION
Fiske Brothers Refining Company
Newark 5, N. J. Toledo 5, Ohio

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LUBRIPLATE

THE MODERN LUBRICANT

ROUND TABLE Discussion

"LITTLE PLANT SCHOOL HOUSE"

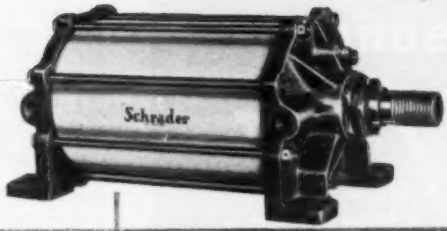
THE FOREMAN who objects to taking a "postgraduate" course in foremanship, on the grounds that he is experienced enough and the results to be expected from taking the course are not worth the trouble, would do well to remember the motto: "The price of progress is trouble." And to the foreman who claims he is too busy to go in for the added study, I would say: "Mr. Foreman, if you are too busy to learn, you *are* too busy!"

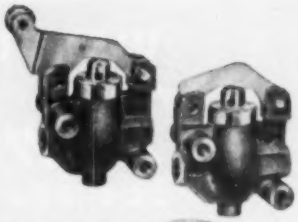
A "postgraduate" course in foremanship covering such topics as organization, policies, cost factors, employee relations, quality control, and safety practices should be compulsory, although enlightened foremen will welcome the opportunity to take such a course. Foremen represent management to workers; they must have the training and information to do so properly. They occupy an important position in the managerial organization of the company. Foremen are usually selected from individuals who show a capacity for leadership, and possess the trade or craft skill necessary to direct the work of a group or section.

Experience has proven that the conference method of conducting "postgraduate" courses suggesting group meetings of foremen, preferably about a table, for the consideration of common problems and for instruction, is the best method. The topics to be considered should, of course, be known in advance, so that each individual may be prepared to present his experience and ideas or make known his difficulties. To be effective, conferences require a leader skilled in the direction and control of discussions. The use of some text material, and occasional talks or lectures are usually advisable. At the close of each meeting the leader will do well to summarize the ideas brought out, and suggest their application. In this way each participant will carry away tangible, usable ideas which he has helped to crystallize.

It is a truism that "many of us spend half our time wishing for things we could have if we didn't spend half our time wishing." Of course it is granted that taking the training refresher course will force extra work upon already burdened foremen. But improvement cannot be

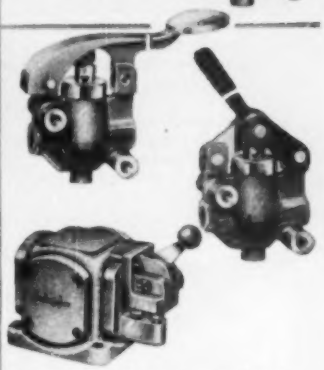
All types. Single acting, push or pull. Double acting, with or without cushion. Bolt, base, leg or flush mountings. Cylinder diameters 1" to 8". Any stroke.





New AIR CLAMPS Bantam-sized units for delivering a powerful push stroke. Variety of sizes and two mountings for almost every clamping application.

EVERYTHING
you need for designing
AIR HOOK-UPS
or solving
AIR CONTROL PROBLEMS



OPERATING VALVES Here are only a few of the 2, 3, and 4-way Schrader valves for you to choose from. Many others for hand, foot or pilot operation.

IMPROVED PILOT VALVES Normally used for remote control of air systems. 2 or 3-way types—with or without timer for setting length of time of flow. Used with water or other liquids to eliminate waste such as on spot welders, cooling systems, etc.

NEW QUICK EXHAUST VALVE Quickly exhausts air from cylinders. Prevents back pressure. Mounts on cylinders.

CHECK VALVES Allow air flow in one direction but check it in the other. Positive tight-sealing.

AIR LINE LUBRICATOR Automatically lubricates air cylinders, chucks clamps, pilot valves or any other air-operated equipment. Wherever there is friction lubrication is necessary.

New SPEED CONTROL VALVES Control speed of air flow in one direction while permitting full flow in other.

Improved AIR LINE STRAINER Small economical device for removing rust, scale, and chips from air line. Easily cleaned.

ROTATING PRESSURE JOINTS Compact, air-tight means of transmitting air pressure from a fixed unit to a rotating unit. Ball bearing construction. Types for partial vacuum or oxygen.

AIR PRESSURE REGULATORS A very simple and effective device for reducing air line pressure. Will reduce line pressure down to zero. Saves wear and tear on tools. Prevents needless waste of high pressure air. Two sizes, either with or without gauges.

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4 Point Plan

TO CUT REAMING COSTS!

1 LESS TOOL COST! W-S complete line of carbide reamers covers over 90% of reaming jobs. Reduced inventory!

2 GREATER ACCURACY! Precision tolerance as close as .0001. Lapped and protected grinding centers for more accurate resharpening.

3 BETTER FINISH! Grinding operations eliminated. All W-S reamers have diamond-lapped cutting edges and special hardened steel bodies stress-relieved before brazing.

4 IMPROVED DESIGN! New type of tool construction. Highly polished flutes with greater chip capacity.

Rely on the famous W-S complete line of carbide reamers — tried and proved for 15 years — to improve production at LOWER COST! Complete range of sizes . . . wide selection of styles . . . straight or taper shanks of hardened steel. Quick delivery on standard reamers with special diameters and tolerances. Make your next reamer order a W-S order . . . see your Wendt-Sonis distributor.

Free! NEW REAMING INSTRUCTION CHART

Determines speed and horsepower for cutting steel, ferrous, non-ferrous and non-metallic materials. Write today: WENDT-SONIS COMPANY, Hannibal, Missouri — 580 North Prairie Avenue, Hawthorne, Calif., 549 West Randolph, Chicago, Ill. Warehousing Facilities: Eastern Carbide Corp., 909 Main St., New Rochelle, N. Y.

WENDT SONIS

CARBIDE CUTTING TOOLS

BORING TOOLS • CENTERS • COUNTERBORES • SPOTFACERS • CUT-OFF TOOLS DRILLS • END MILLS • FLY CUTTERS • TOOL BITS • MILLING CUTTERS • REAMERS ROLLER TURNING TOOLS • SPECIAL BITS

obtained by merely wishing for it. Many foremen can't see the necessity for this so-called "postgraduate" foremanship training program. They feel that their records speak for themselves as far as their efficiency as foremen is concerned. These foremen are usually self-made men who have come up from the ranks. To such a foreman I would say: "There's nothing wrong with being a self-made man if you don't consider the job finished too soon."

There's always room for improvement. But people seldom improve when they have no other model but themselves to copy after. That's why the "little plant schoolhouse" offers the foreman not only the chance to learn how to do his job better but also obtain personal benefit through self-improvement. There is an old saying about the value of study which bears repeating: "Iron sharpens iron; scholar, the scholar."

Harry Kaufman
Philadelphia

•

I BELIEVE that if the management set up training courses for foremen every supervisor should attend whether he is a man of 40 years' supervisory experience or only a few months, for this reason: they do not cost the foreman anything, they are held on company time, and I am under the impression that any foreman under those conditions would be acting stupid not to attend. He may learn something new or he may not, but I do know that he will hear some interesting discussions that arise from questions put to the teacher and these alone are worth the time spent. At a large plant where I was employed an expert on foreman training and employee relations

"I think I'm getting the hang of it."

LEADERS OF INDUSTRY MARK WITH NOBLEWEST

How Singer marks best with Noblewest

FOR nearly a half century Noblewest has been supplying leaders of industry with precision marking equipment. One of these leaders is the Singer Sewing Machine Company—long realizing the importance of permanent identification on the components of their famous sewing machines. Singer uses every basic type of Noblewest roll marking machines including general purpose and rapid production models. All employ the Noblewest Roll-O-Matic principle which permanently rolls in inscription markings that last as long as the product itself. Like Singer, you will find that the sure way to mark your products faster, better, at lower cost is to call in Noblewest—the leader in modern rapid precision marking machines, marking tools and marking dies. The Noble & Westbrook Mfg. Co., 17 Westbrook St., East Hartford 8, Conn.

SERIES 50 This is the Noblewest general purpose marking machine with full pneumatic operation of both work table and die slide. Can be tooled for 1) marking round surfaces, 2) marking flat surfaces, 3) for precision graduating, 4) for serial numbering with Noblewest automatic numbering heads. Singer has this machine tooled for marking 18 different parts, but there is practically no limit to the number possible.

SERIES 21 This Noblewest rapid production marking machine has a production capacity of 2,500 to 3,500 pieces per hour. It is ideal for parts on which the markings must be accurately positioned. It features a six-station mandrel carrier dial. Work is placed on mandrels, marked and automatically unloaded. Automatic die pressure compensator assures uniform depth of inscription.

SERIES 19 This model has the highest production capacity of all rapid precision marking machines—up to 6,000 pieces per hour. Featuring a high speed notched carrier dial, pieces are gravity fed and unloaded. Die-holder has automatic pressure compensator that produces uniform depth of marked inscriptions regardless of slight variation of part sizes. Carrier dials are interchangeable, a wide range of parts can be marked.

SERIES 20 This rapid precision marking machine will permanently mark up to 5,000 pieces per hour. It is best suited for parts that will stand up and rotate on the carrier dial. Operator simply places parts on rotating dial and they are automatically unloaded after being marked. Singer uses three interchangeable pressure dials for marking approximately 50 different parts on this one Noblewest machine.

MARK IT BEST WITH

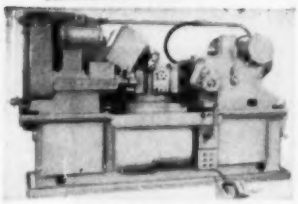
NOBLEWEST Roll-O-Matic MARKING

NOBLEWEST IMPROVED MARKING DEVICES

EQUIPMENT FOR MARKING · GRADUATING · EMBOSSING · NUMBERING

Copyright, 1950, by The Noble & Westbrook Mfg. Co.

GOSS and DE LEEUW
AUTOMATIC CHUCKING MACHINE



means a complete piece... at each index cycle

When a piece is finished it is *completely* finished without the necessity of a second operation. Furthermore it means *more* finished pieces in a given period of time and greater accuracy in *every* finished piece.

The "1-2-3" Method is exclusive with Goss & DeLeeuw. With it, three ends of a piece can be machined at a single chucking of the work, simultaneously or in sequence depending on the operations involved. It will pay you to investigate.

Send for illustrated literature giving detailed information. Send samples and ask us to give you cost estimates of handling this work on a "1-2-3" Goss & DeLeeuw Automatic Chucking Machine.

GOSS & DELEEUW
QUALITY PRODUCT-QUANTITY

GOSS and DELEEUW
MACHINE COMPANY, KENSINGTON, CONN., U.S.A.

was engaged for a month to give talks on those topics to the supervision.

All the foremen admitted that out of those discussions developed a far better understanding of each foreman's problems, and how closely the whole production schedule hinged on complete team work between the supervisors throughout the plant.

Training classes for foremen are nothing new. I applied for a supervisor's job close to 50 years ago, in Britain, and at the resulting interview I was informed that if selected I would be expected to attend training classes held for foremen once a week on company time; also during the first World War one large company that expanded to five or six times its size, necessitating large numbers of added workers, plus additional supervision personnel. Around 50 promising young men were taken off machines and the bench on the recommendation of the various supervisors and made foreman or assistant foreman. These new supervisors went to training classes for six months twice a week where they listened to talks by top supervisors from around 20 different plants, within a 20-mile radius of the concern.

Finally, if you listen to a chap who has made good and come up from the ranks the hard way, and he really understands shop language and he is getting the nice salary that comes only when you have really got something on the ball, you can just inform him of your problem with certainty that this chap's solution, even if you don't agree with him, will give you something worthwhile to think about.

Arthur Silvester
Niantic, Conn.

•

AN OLD Yankee mother once said, "It takes more than years to make a man." Ed could well ponder this little phrase, for, while he may be a good foreman, he has not grown up intellectually.

Many a foreman has reached his position by means of promotion while he is not really rounded out sufficiently to hold his job. Other men have become foremen because there seemed to be nobody else in an organization to take the place. Some of them realize this and so put their men into various positions where they can help him hold his job.

When Ed says that he is a big boy now, he may be in stature, but, when a foreman thinks he knows it all, look out. He doesn't like "pipsqueaks" to tell him points about

Let us help you solve your SPEED REDUCER PROBLEMS

Farrel speed reducers have incorporated in them the experience gained in the solving of innumerable problems requiring considerable pioneering in gear engineering. The result is a wide range of types (a few of which are illustrated here), that are standard in principal features, but adaptable in critical detail.

All units are supplied with precision gears, generated by the famous Farrel-Sykes process for smooth, quiet, efficient power transmission; shafts and bearings factored to safeguard against interruption of vital processes; gear cases proportioned to withstand repeated heavy peak loads; joints sealed to prevent entrance of dust and dirt.

But, that is not all. Without sacrificing the advantages of general standards, the design of these units permits an engineering freedom in proportioning gears, shafts, bearings and even some housing dimensions to meet specific load, speed and service requirements. This flexibility has resulted in the solution of innumerable application problems.

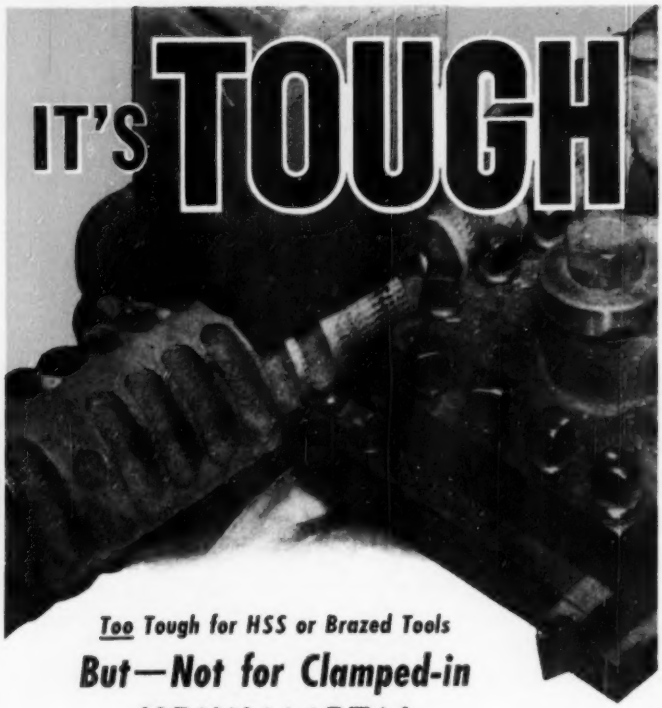
Write for further details. Ask for a copy of Bulletin 449 —no cost or obligation.

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y., *Sales Offices:* Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Cleveland, Cincinnati, Detroit, Chicago, Los Angeles, Tulsa, Houston, New Orleans

Farrel-Birmingham®

Problem:
A gear unit to transmit calculated load of 100 HP from a 125 HP, 1750 RPM motor to induced draft fan at 290 RPM, continuous 24-hour service.
Solution:
Equivalent HP = 100 x 1.50 (service factor) = 150
Ratio = 1750 ÷ 290 = 6.03:1
Tabulated data in Bulletin No. 449 shows SR-137 unit to be correct size for this application.
SINGLE REDUCTION UNIT
SINGLE REDUCTION UNIT WITH PINION AND OUTBOARD BEARING
HEAVY DUTY REDUCTION UNIT
TWO SPEED RIGHT ANGLE UNIT
DOUBLE REDUCTION UNIT
FB-623



Too Tough for HSS or Brazed Tools

But—Not for Clamped-in
KENNAMETAL

This is a tough job—maybe you'd say, "not suitable for carbide tooling." It's a long, slender cast iron roll having rough, abrasive inclusions, and more interruptions than plane surfaces. The machine and the tool set-up, while adapted to make the best possible use of existing equipment, are far from ideal.

The job was too tough for HSS or brazed carbide tools—*but* not for sturdy Kennametal clamped-in K6. Here's the record: With Kennametal tools machining time is down 62%, production is up 45%, and tool grinding is down 99%. See particulars in table at right.

Your job may not be this tough. But consider this important point—a tool that takes tough jobs in stride is the one to use on routine production jobs where floor-to-floor time, uninterrupted machine operation, and overall cost per piece must be determined with accuracy, and maintained. That's Kennametal. Let us show you, in your shop.

The Facts

	HSS Tools	Kennametal
Feed	.030"	.044"
Cut	⅛"-¼"	⅛"-¼"
RPM	40	80
SFM	39	78.5
Mach. Time	39 min.	15 min.
Prod./8 Hrs.	11	16
Pcs./Grind	Avg. 3	Avg. 350
Pcs./Tool	—	5250 (est.)
Tool Cost	—	$11.45
Tool Cost/Pc.	—	$.0022

Are you receiving our technical bulletins on carbide tooling? If not, mail us your request for them . . . no obligation

Write for our latest catalog

KENNAMETAL Inc.
Latrobe, Pa.
MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES AND CUTTING TOOLS THAT INCREASE PRODUCTIVITY

his work and some of them may be better trained then he is, so he is foolish there, too.

It has been said on good authority that Henry Ford was once conducting a friend of his through his plant. This man was a physician and asked Henry if he thought it was possible to assemble cars on a conveyor.

This set Henry to thinking. Result? Henry was a pioneer in the production-line assembly and he showed all others how to cut assembly costs to the bone.

Select another instance: A young college graduate wanted to learn the foundry business, so he entered a foundry as a molder. He didn't know the details as to how the money is made in this line, but, in college, during any spare time he read up on time and motion study. After two months, this chap was making 28% more molds than any other man who was doing identical work.

And so it might be that somebody could come along and show Ed a thing or two if he were not too stubborn to learn. He might profit by it.

Many of the most progressive plants are trying to improve the conditions in their shops by bringing in talent from the outside for the purpose of adding to the knowledge of their men and also improving their methods of operation. In this way, some of them have been able to step up production and reduce costs.

Such talks as these are in the line of progress and, as they allow their men to attend these on company time, they should be glad to accept these opportunities to make themselve as valuable as they can to their employers.

Of course, as a rule, in many places, the men have the option of attending or not.

F. H. Stebbins
Worcester, N. Y.

•

BASICALLY all foreman and all lower supervision should be given additional training along the lines of better management, employee relationship and a chance to become familiar with problems of higher management. It is in this manner that these men can be trained to hold down jobs of more responsibility. All foremen desire to advance. Nearly all feel that they should some day have the boss' job. Most of them think they could hold it down. But most of the foremen do not know all the problems encountered in the higher positions of management. They have no way of knowing the many and varied problems that can and do arise from the higher managerial

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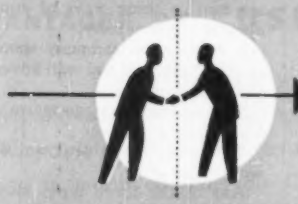

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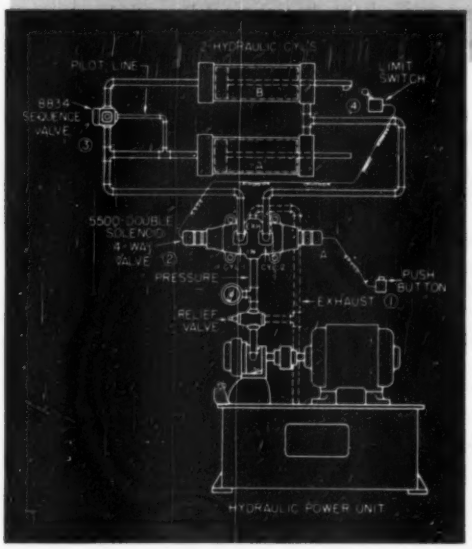

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Cycle is started by momentarily depressing push button 1 which energizes solenoid coil of Model 5500 4-way control valve 2. Cylinder A extends; at completion of outward stroke, pressure will increase in cylinder A supply lines causing sufficient pilot pressure to open sequence valve 3, permitting oil to flow to cylinder B, and cylinder B extending. Limit switch 4 is momentarily actuated by piston rod of cylinder B, energizing opposite solenoid coil of 4-way valve. Oil flow to cylinders is reversed and cylinders A and B retract. Where piston velocities and inertia of connected loads are high, cushion cylinders are recommended. If external stops are provided, cushioning is not required.

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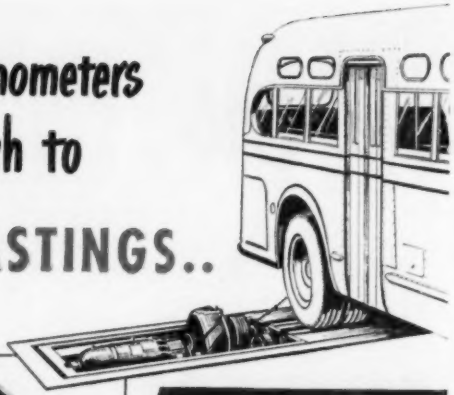

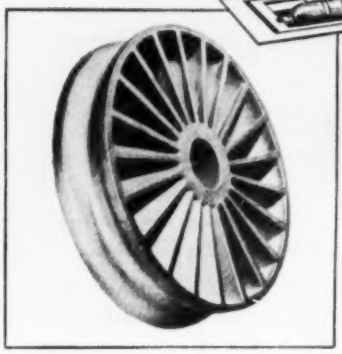

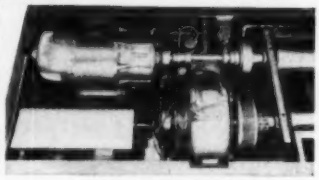

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positions and unless they are fully equipped to handle them they cannot succeeed.

How can they learn? By educational courses only. Where can they get this data? Either by self study on the general subject or from courses given by the company they work for. The second method is the most successful in the direct approach of understanding the problem as its exists and affects the individual.

Now comes the hardest part of the problem. How can a company train its employees without setting up a resentment that usually causes the courses to end in disaster? There are two or three ways of approach open to any company.

1. A program company sponsored and well planned and well advertised but not compulsory.
2. A compulsory program after plant hours.
3. A compulsory program during working hours.

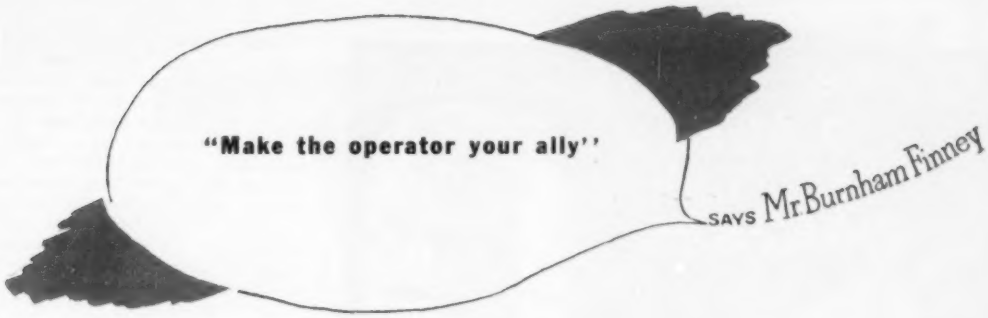
Any of the three types may succeed, depending upon the company and the conditions that exist within the company. Compulsory programs frequently cause more resentment than other types but again the attendance is not all that can be desired when foremen or supervisors are left to attend or not attend as they see fit. This does, of course, weed out very quickly those not interested in working for their own advancement.

Probably the most successful method is the one in which the education is given on company time. Yes, this is costly and a great cry goes up in management circles—is it worth it? The answer is yes. It is much cheaper to keep employees well trained than to be constantly having a turnover and having to train new ones. Proper foremanship can do much to improve management and labor relations. This is important today. It is costly if the relationship is not harmonious. More costly than educational courses for supervisors on company time.

A word of warning: Be sure that your training courses are teaching something new as well as repeating the old stuff. Be sure that your trainer keeps ahead of his class. Be sure that he knows how to teach adults properly.

Why not poll your supervisors and find out what they want? Start off by making them feel that it is their idea. It works wonders and often means the difference between success and failure on a program.

Charles D. Townsend
Ft. Wayne, Ind.



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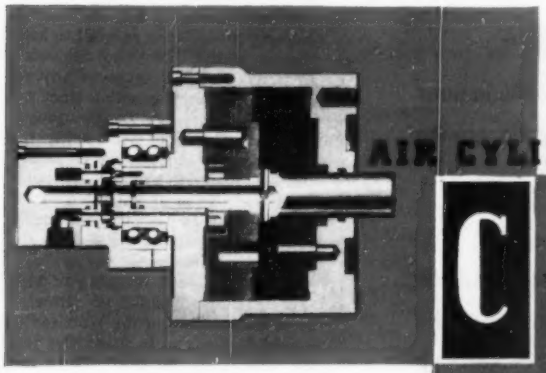

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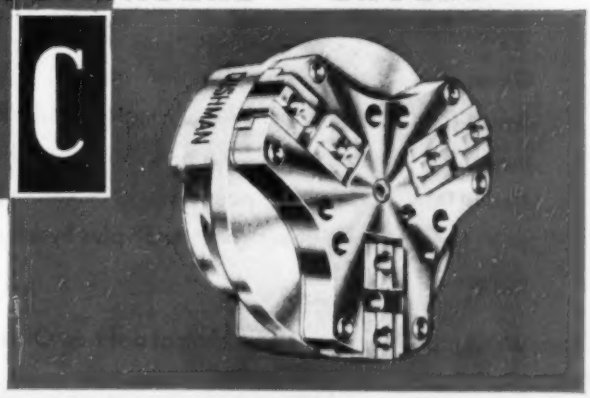

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A good foreman is one who never finishes learning. If one feels that he has reached the stage where he knows all there is to know, someone should call up the undertaker and have him measured for a rugged, long box because that man is through. No matter how much experience a man has had, just remember that there are others who have had as much and more. The combining of these experiences would result in each receiving the benefits.

The question as to whether the course should be compulsory is a touchy one that is likely to cause considerable repercussion. A decree, issued by management, would certainly not be received very favorably by the supervisors. Don't get too bossy with your bosses, Mr. Manager, or they might go into reverse on you. Personally I don't like to have anyone thrust anything on me without first consulting me about it —I suppose I'm still bull-headed. I think it is only natural for a free-thinking man to be approached in the spirit of cooperation — don't make it seem dictatorial.

It is up to management to decide the best approach to make in presenting the idea to his foremen and be ready to take the consequences of his action. It seems certain that the one who refuses to cooperate in the scheme is going to be the loser in the long run. No one can fail to keep abreast of the times and not retrogress. Why should there be any resentment if the proposition were put up to the foremen in the proper manner? The one who holds the executive position should be broad-minded enough to visualize the benefits of such a course, provided that it is not put on by an academic crackpot whose vision is limited to the inside of a book.

This course—call it what you will: "Foremanship Trends" or "How to be a Better Bull-of-the-Woodser"—should be such as to make the (for the love of world peace don't call the foreman a student!) participating executive feel that he is not wasting his time over some piddling dribble usually put out by some so-called instructors. Foremen, as a general rule, are brainy chaps who appreciate the value of their time and it behooves the employer to weigh the prospects of any contemplated course with considerable thought.

I think any course for mature men who have been in the business for years is fine provided it doesn't get too involved with monotonous, uninteresting theory. The course should be a get-together affair wherein the men sit around a big table—none of

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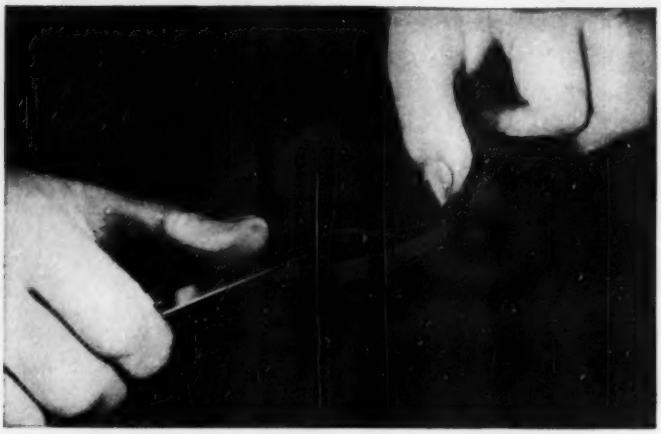

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this rear-end paralyzing stuff where the participants are packed in a classroom. Give the old guard some easy chairs and provide them with smokes—I've no particular objections to a refreshing cocktail at recess time! To hell with formal educational methods; let them spread their elbows on the table and, if conformable with absolute comfortableness, let them put their feet up while they lean back and contemplate the effectiveness of what is being put over to them. In short, let them feel at home and you'll find that they'll open up and astound the world with utterances of jeweled wisdom.

John Homewood
Ontario, Calif.

•

FOR THE MOMENT, Ed is unhappy — just because he is required to attend a "postgraduate" class for foremen. And that brings up the question: Will "postgraduate" classes help an experienced foreman, and will they pay?

There can be no one answer possible that would fit all companies, and all foremen. From long experience, I would say — YES, they do pay—with the right type of management, and the right type of foremen.

Let's consider management: When I first graduated from college, I was employed as a staff engineer by a large manufacturer. During employment preliminaries, I was interviewed by various officials, and finally by the plant superintendent.

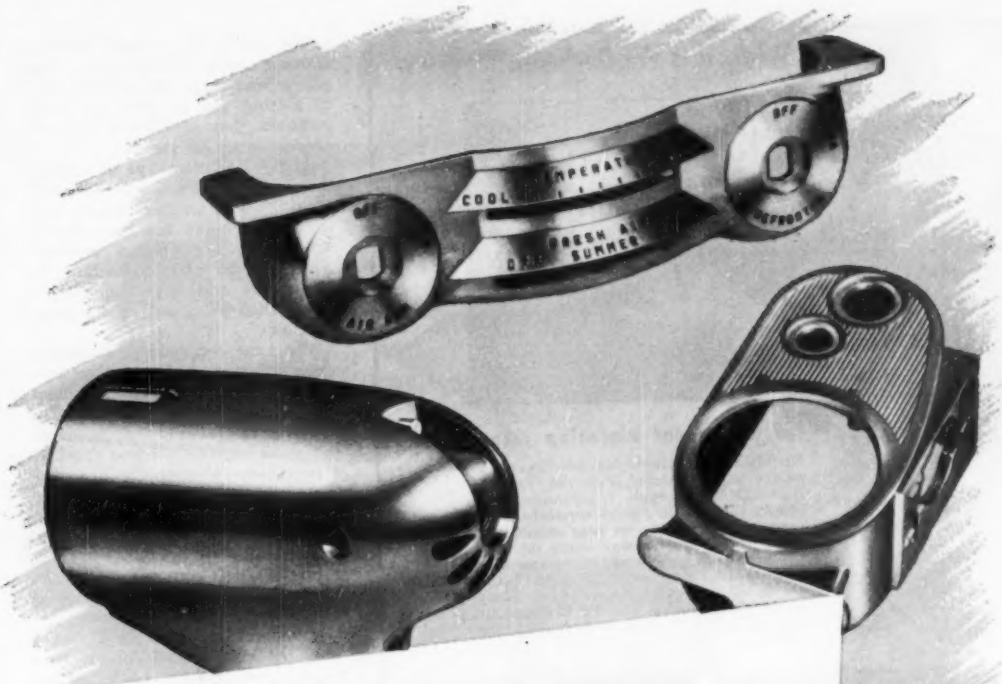
This superintendent was really a plant manager, having charge of 8000 men. He was not a technician of any kind, not even a college graduate, but he certainly was a shrewd executive. He knew how to use his technicians' brains and skill; he knew how to organize, and he was a champion pusher—not a leader, but a pusher. As I had been hired by more important people, he didn't screen me, but rather greeted me as a newcomer who might be useful to him later.

He read my application rather carefully and spotted the statement that, at that time, I was taking a reading course in management technique. He looked up in amazement.

"You're actually taking this course now?" he inquired. "Yes, sir."

"What in the name of Heavens for?" he demanded. "What was the use of going to college, if you still have to keep on studying books?"

I never did answer that question to his satisfaction. Later, I found out that he had married the founder's daughter: this explained everything



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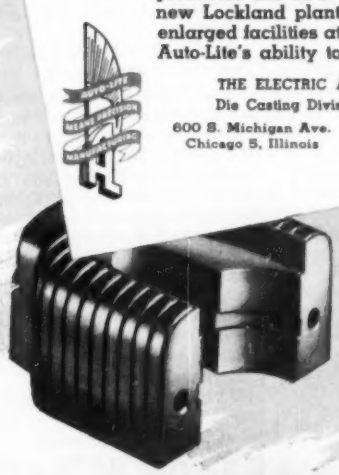

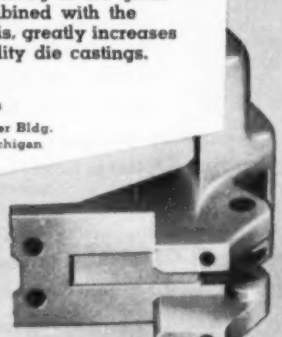

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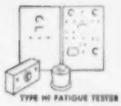
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to me. The point is—there were no training classes for foremen in those plants, and there was no hope ever of getting any in. Had they been initiated, they would not have succeeded under his regime.

And yet another type of management. In this plant, I was production manager, and assistant works manager. The works manager was an Englishman, an Oxford graduate, and a highly skilled machine designer. He was quite ignorant of many shop processes, so I handled the shop.

The time came when it became necessary to dispense with the services of our toolroom superintendent. The works manager agreed with me. For good reasons, the man had to go.

For his successor, I had chosen a former toolmaker, who had been acting as a foreman over some inspectors on very fine precision work. This man was young, ambitious, an indefatigible worker, and a born leader. He got work out of men, by the use of a bit of humor, and a smile. The men idolized him.

My superior was horrified when I proposed his name—so horrified he tried to convert me to his theory of management.

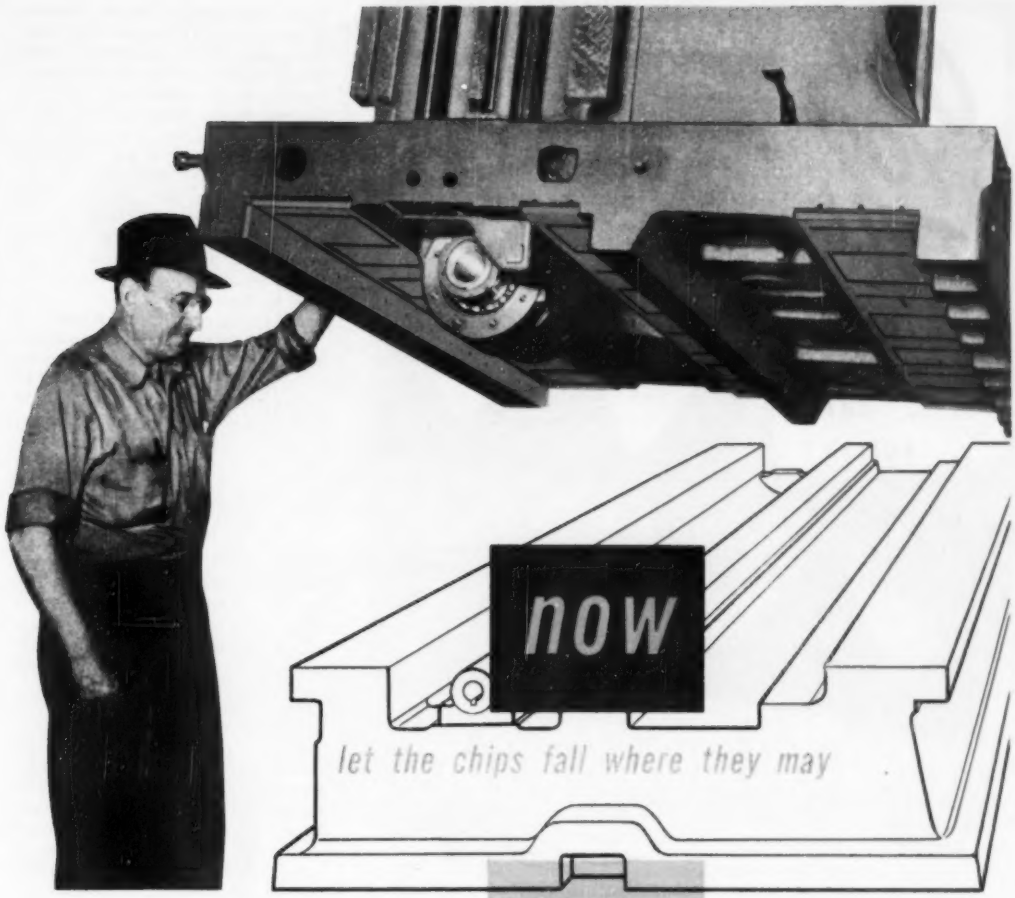
"Mr. Matter," he said, "you just can't do that. We need a toolroom superintendent—I agree. Very well, let's go out and hire a toolroom superintendent. But don't take an inspector and try to make a toolroom superintendent out of him—it just isn't done."

And in England it just isn't done, I'm sure. If your father was a butler, you can hope to finish up as a butler, too, or, perhaps, a houseman, but certainly not a horse trainer—even if you're the best horse trainer in the world. The caste system doesn't permit it.

On the other hand, I know many plants—and most of them are very large—where the major management understands thoroughly the value of continuously bringing foremen up to date with modern methods and discoveries. In these plants, foremanship courses are well received, and the results are acknowledged to be definitely worth while and profitable.

Sixty per cent of employers today do not favor training courses for foremen. Some believe that it is up to foremen to secure their own training; some believe that this savors too much of a paternalistic attitude, and some have other reasons.

If I had the job today of selling the idea of training courses for foremen to a hostile management, I would tackle it from the safety standpoint first. I would show by figures that



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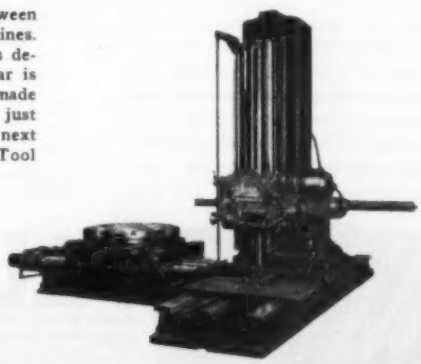
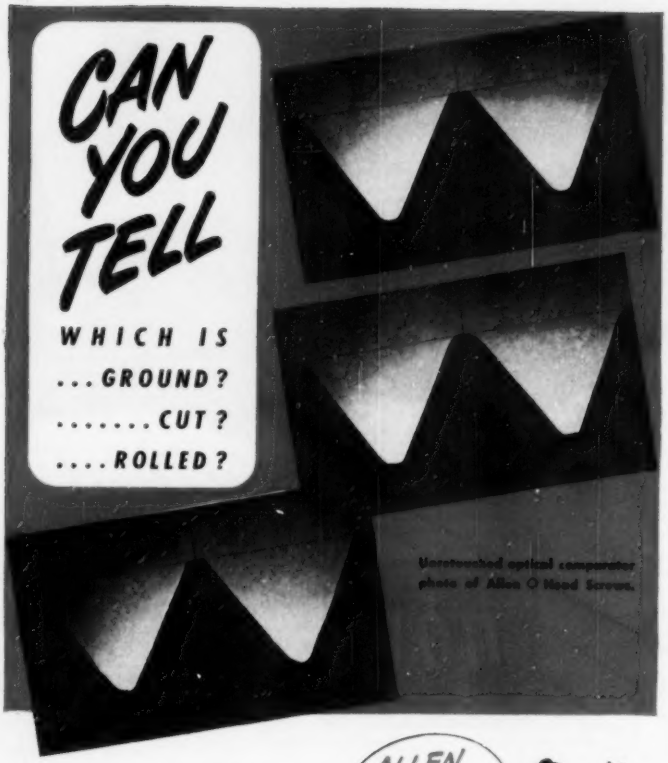


THOSE WHO BUY GILBERT BUY GILBERT AGAIN



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foremanship and personnel training in safety practices means fewer accidents and lower insurance rates. That's money you can see and count. From there I would point out that our business is different from other businesses, and that it was up to us to train our men in our ways and practices. Many times much of the desired training can be secured in local high schools at night at moderate rates. If the situation required our own instructors, I would work on that basis, but always keeping two facts in mind:

1. Foremanship training really is worth while, and it does pay off.
2. Somewhere there are figures that can be found or arrived at which will back this up — if enough time and perspiration is expended to find them.

James K. Matter
Detroit

•

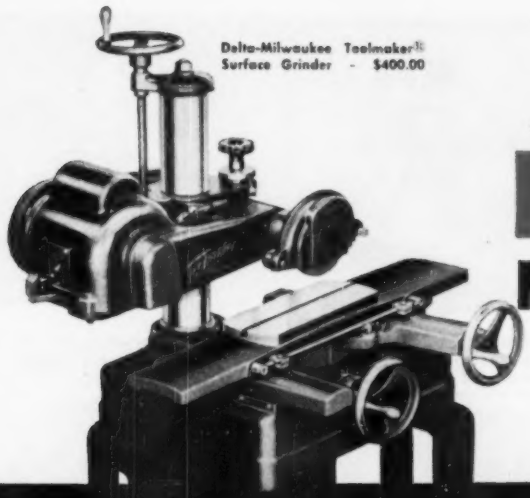
CACHE OR CONFESS?

THERE ARE several ways of circumventing the natural tendency to want to hide one's mistakes. Inasmuch as all are capable of success the mode chosen depends rather on the end results desired.

For instance in a shop operating under strict detailed cost control a practice of hiding spoiled work could falsify the figures considerably. Material charges would actually be double, due to duplication. Similarly labor, with its share of overhead could run from a low fraction to literally 100%. However possibilities of such actually happening are very remote, because it is in the phrase "Operating under strict detailed cost control" that one antidote to the "caching" problem lies. Such cost systems make the withdrawal of material for any purpose, without making a written chargeable requisition a virtual impossibility. While the storekeeper may not know what jobs are being run in the shop, certainly the foreman does. His daily or periodic chore of passing on shop requisitions therefore closes this alley to the would be "cacher."

To those of managerial bent who at this stage may well have a mental picture of a caching offender as a furtive scoundrel, one to be shown the door at the first opportunity, a few words. Both actions are human failings to which we are all prone. The making of mistakes is not a prerogative reserved solely to the stupid, the incompetent, or the naive.

The problem of spoilage is shop-wide and while doubtless its solu-



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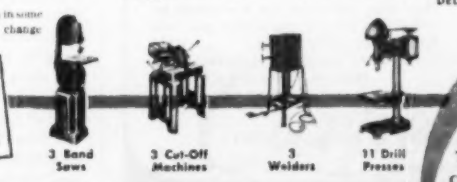

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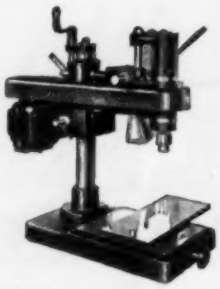
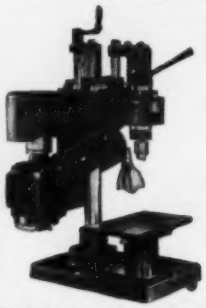
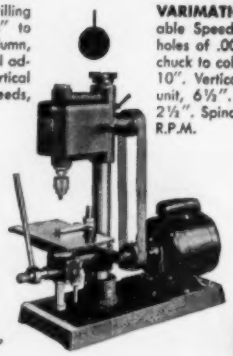


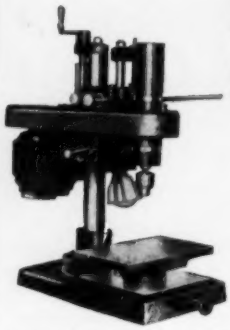
HAMILTON, Super-Sensitive Tapping Machine. Taps from the smallest and finest to 10-32 inclusive. Center of chuck to column, 3¼". Table to chuck, 4". Vertical adjustment of table, 3½". Vertical travel of table, 1¾". Spindle speeds, 1200 to 2600 R.P.M.

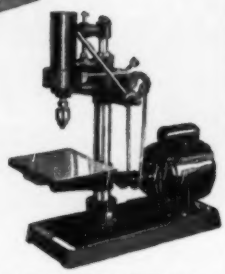


MAXIMUS, Super-Sensitive Drilling Machine. Drills holes of .004" to 5/16". Center of chuck to column, 8". Table to chuck, 10". Vertical adjustment of drilling unit, 10". Vertical travel of drill, 3". Spindle speeds, 750 to 8750 R.P.M.



VARIMATIC, Super-Sensitive, Variable Speed Drilling Machine. Drills holes of .004" to 5/16". Center of chuck to column, 5". Table to chuck, 10". Vertical adjustment of drilling unit, 6½". Vertical travel of drill, 2½". Spindle speeds, 840 to 9300 R.P.M.





FOUR DRILLS & A TAPPER

MAXI-JR., Super-Sensitive Drilling Machine. Drills holes of .004" to 5/16". Center of chuck to column, 5". Table to chuck, 8". Vertical adjustment of drilling unit, 8". Vertical travel of drill, 2½". Spindle speeds, 750 to 8750 R.P.M. (Special drive for higher speeds available).

A-M, Super-Sensitive Drilling Machine. Drills holes of .004" to .250". Center of chuck to column, 3¼". Table to chuck, 8". Vertical adjustment of table on column. Vertical travel of drill, 2". Spindle speeds, 788 to 9500 R.P.M.

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THE Hamilton TOOL COMPANY

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tion is to management a prime concern, the approach seems rather mislocated. Ed's intentions may be of the best and are to be commended for the spirit in which they originated. It would seem a foreman who suddenly decides as Ed has done to make his men over would do well to consider what lies around and above him. There will be little percentage for the men and certainly in the long run none for him if the company's policy or even Ed's own are not based on complete fairness and honesty.

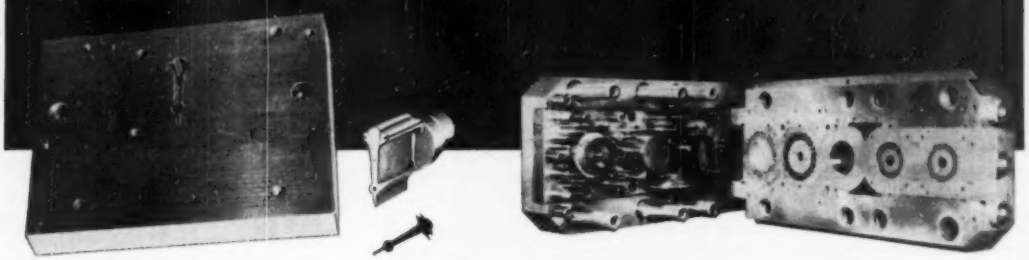
The intangibles of "virtue is its own reward" are mighty hard to sell to an individual or group who daily see examples that those who publicly profess they "never give a sucker a break" and are by their coworkers and subordinates aptly classified as not having intelligence enough to pour water from a boot with instructions printed on the heel, go their merry way, secure come what may.

In view of this there should be small wonder at a desire to hide one's mistakes from view. Though not necessarily familiar with Shakespeare's—"The evil that men do lives after them, the good is oft interred with their bones," the average shopman could recognize its aptness right away. Working for a boss whose only comment is when things are not right and never uses praise nor approbation is not always conducive to bringing out the best in any of us.

An example comes to mind of a certain pre-war tool and die shop situated on the bank of a large ship canal. Peopled with craftsmen of the old school who knew their trade, there were nevertheless mistakes made. Since this was before the discovery of a good "putting-on-tool" and the open windows were handy, into the canal went the blunders and bulls. The shop boss's hide was harder than treated 6135. Each spring when the canal was drained for repairs, identifiable scrap came home to roost and walking papers followed. Now, while there is no question as to the rightness of this justice—belated though it was, as a corrective measure it failed utterly. In later years when the war was on, the shop filled with 90-day wonders and the boss was upstairs, one of his balding old toolmakers took over the floor. Despite the larger turnout of errors due to the incoming "tourists" there was far less steel on the canal bottom next spring.

Probably this was due in a large measure to the newly instituted shop control as previously mentioned but

why be satisfied with "EXPECTED PRODUCTION" from *your* tools and dies?



Production Was "Satisfactory"
. . . But This Toolmaker Wanted MORE:

Output from this blanking die and punch seemed O.K. Yet the toolmaker, not content with only "passable" performance, re-examined the tool steel used. With the Carpenter Matched Set Method as a guide, he was able to put his finger on the one steel best suited for the job. Now, with No. 610 (Air-Wear), output has increased over 200%—and the die runs *4 times* longer between grinds. What a return—simply because he wasn't satisfied with "good enough"!

28% MORE Parts Between Grinds
. . . Because "Expected Production" Wasn't Good Enough:

Everyone agreed: This intricate die for blanking motor stator and rotor laminations from abrasive 2½% silicon steel was performing up to normal expectations. But that didn't stop them. Going just one step further, the toolroom foreman selected HAMPDEN (Oil-Wear) from the Carpenter Matched Set. Now the die is giving 28% more parts per grind—thus reducing downtime and regrinding expense. It really pays to go after *more* than "Expected Production"!

These jobs aren't the "one-in-a-million" variety. Results like these are being duplicated all over the country—because tooling men are no longer satisfied with "Expected Production" once they use the Carpenter Matched Set Method. And this Method is amazingly easy to put to work. One of its biggest advantages is the *simplification* it gives you—simplification of selection, heat treatment, and inventories. Prove it to yourself—it's easy. Simply pick out a job—put the Matched Set Method to work—then compare results!

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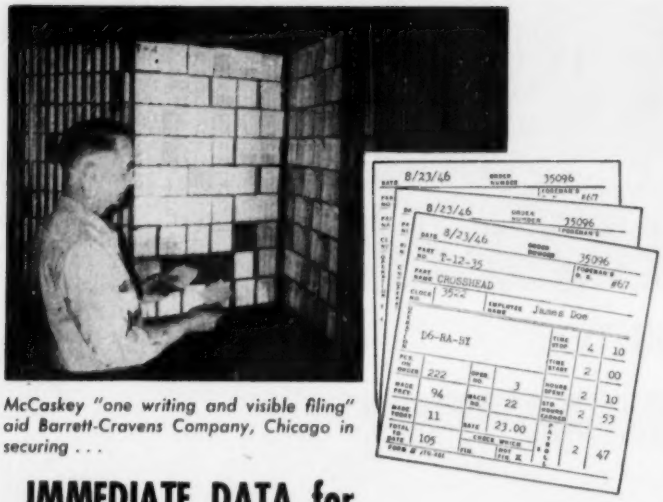

McCaskey "one writing and visible filing" aid Barrett-Cravens Company, Chicago in securing . . .

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(1) Status of every production order visualized within minutes after the completion of an operation;

(2) Operation cost data immediately available for analysis and investigation of variations;

(3) Accurate, up-to-the-minute data reduce dependence on stock chasers;

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more likely to the new boss. Old Tom didn't make anyone over and sometimes he roared more then the old man—but he was fair and no man deserving of an increase had to ask for it. He got it plus a little chat at the same time that guaranteed more for the company.

A. M. Elliott
LeRoy, N. Y.

•

IN ANY plant where there is not an inspection system, and a check kept on faulty and spoiled work, you will get a larger proportion of spoiled parts even if you have a crackerjack team of workers. They will get slack if the system is slack. They have to be kept on their toes. That is the foreman's job.

I don't believe that a talk to each one of his men by Ed is the most tactful method of preventing spoiled work. It brings out into the limelight the fact that he has a poor lot of machinists. It also points out his own shortcomings as a boss. The news would be all over the plant in a short time.

A better way, I believe, would be for Ed, each time he gave a man a job, to impress upon him to be careful, point out clearly what to do, and how he should do it, and follow up the advice continually by seeing and knowing that his instructions are being carefully carried out, at the same time being careful to let the man suggest a better method of operating or doing the part by asking him if he has a better way, and if he has, discuss it. Then Ed could make his decision as to the procedure.

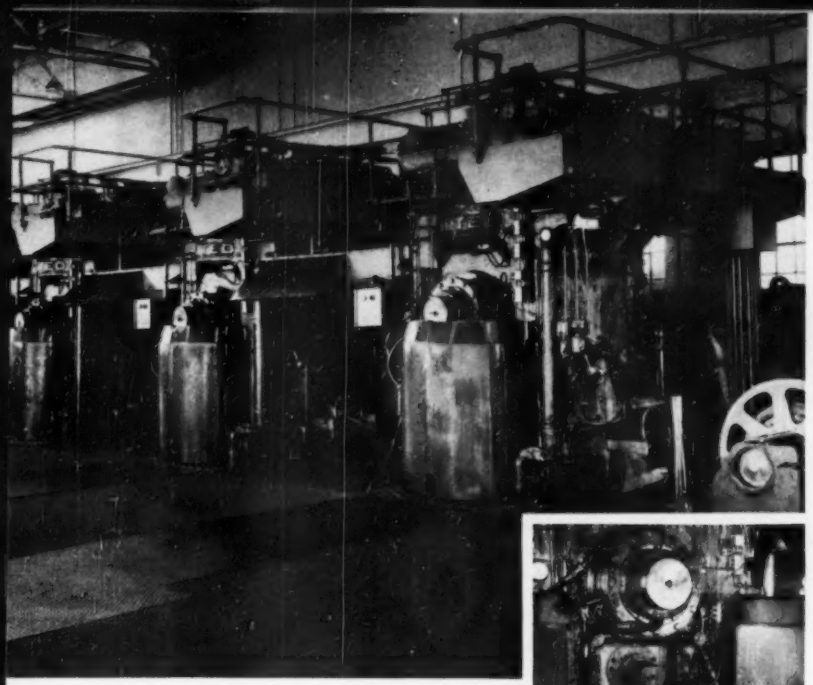
Continue this procedure and Ed will find that not only will spoiled work be greatly reduced, but the quality of workmanship will increase, and while Ed will never entirely wipe out a certain percentage of spoiled work, it will be reduced to the point where it is negligible.

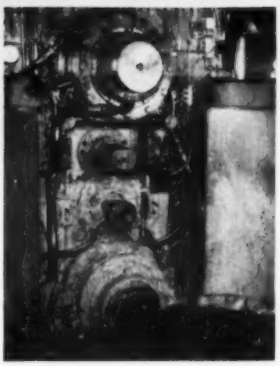
Arthur Silvester
Niantic, Conn.

•

LACK OF understanding and trust between the worker and foreman that results in the worker hiding defective or spoiled work may be traced in large part to the specialization and functional control that are limiting the modern foreman's duties and relationship with his men.

Where the workman has faith and trust in the foreman, he would not attempt to hide defective work and would not hesitate to enlist the help and experience of the foreman to





Putting the "squeeze" on maintenance costs

IN this modern 5-stand tandem cold-rolling mill at a midwest steel mill, giant backup rolls squeeze strip steel to thousandths of an inch thickness. Taking the brunt of this punishing work are the end bearings on the rolls. Protection and proper operation of these bearings call for a lubricant that can really take it.

Recommended by a Standard Oil lubrication specialist, a STANOIL Industrial Oil has been used on these bearings for 1½ years of hard, continuous operation. Clean, effective lubrication, together with excellent maintenance practices by mill operators, has held bearing-upkeep costs to a minimum. The oil-circulating system, which includes two 6,000-gallon oil tanks, has remained entirely clean. STANOIL has shown practically no deterioration in use.

You can rely on this unique multi-purpose oil to give you the same, clean, dependable service in hydraulic units, speed reducers, and circulating systems. You can rely, too, on the expert, on-the-spot service of a Standard Oil lubrication specialist. How you can obtain his help, quickly and easily, is explained at the right.

Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Ill.

STANOIL
TRADE MARK
Industrial Oil

What's YOUR problem?

Warren Erickson, Lubrication Engineer at Standard Oil's Chicago office, helped this midwest steel mill (see left) make important savings through the use of STANOIL Industrial Oil on a cold-rolling operation. He was close at hand, gave mill operators engineering service when they needed it.

There's a corps of Standard Oil Engineers and lubrication specialists throughout the Midwest. You'll find one located near your plant. You can reach him simply by phoning your local Standard Oil Company (Indiana) office. His experience and special training will help you get maximum benefits from STANOIL and other outstanding products such as:

STANICUT Cutting Oils. These special-duty cutting oils meet today's most exacting requirements and highest production schedules. Grades vary in viscosity and compounding. Each contains the correct proportion of extreme-pressure and friction-reducing ingredients.

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STANOSTAMP Compounds. These widely accepted products have demonstrated their ability to handle heavy stamping or drawing operations of low-carbon or alloy steels. Each of the three grades is a paste compound to which water can be added to provide the most economical applications. STANOSTAMPS offer maximum protection for dies and work, can be readily removed in conventional washing equipment.

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What's YOUR problem?

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To help you get the maximum benefit from the STANORUSTs, Standard Oil has a corps of lubricating specialists located throughout the Midwest. One of these men is near your plant. You can get his services quickly and easily. His wide experience and special training in rust prevention will help you make real savings. Why not arrange today for his visit by calling the nearest Standard Oil (Indiana) office?

8 grades of STANORUST

STANORUST No. 3-FP
is a fingerprint remover. It can be used to eliminate the cause of fingerprint corrosion and to deposit a protective film in one simple dipping operation.

STANORUST No. 4-V
has a Stoddard-solvent base which evaporates to leave a thin film for temporary rust prevention.

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provides economical protection under average indoor conditions. It can be applied cold.

STANORUST No. 95
is designed for protection of parts in moderately severe indoor storage. It also can be applied cold.

STANORUST S-1
is a semi-fluid product, designed to give protection over a longer period than the No. 95 grade. It is suitable for outdoor service, if parts are under cover.

STANORUST 1-XC
is a non-fluid product which is recommended for protection of parts under severe outdoor conditions. It has been thinned with a volatile solvent and can be applied cold with a swab or brush.

STANORUST 3-X
is a soft, grease-like product and offers protection against severe indoor storage and moderately severe outdoor conditions.

STANORUST 6-X
is a heavy, petrolatum-type product that protects against the most severe outdoor exposure. It meets a government specification which includes a requirement that it protect against corrosion for a period of not less than 10 years without renewal.

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● STANORUST Rust Preventives offer maximum protection against rust because they contain a moisture-displacement additive which makes them far superior to straight mineral oils or to petrolatums frequently used for rust prevention.

The STANORUSTs have been thoroughly tested and proved effective on a wide variety of rust prevention jobs, ranging from elimination of fingerprint corrosion to protection of equipment under severe outdoor storage conditions.

The complete STANORUST line is briefly described at the righ.. The booklet offered will bring you complete details. You can secure a copy by calling the local Standard Oil (Indiana) office or by writing 910 South Michigan Avenue, Chicago 80, Illinois.

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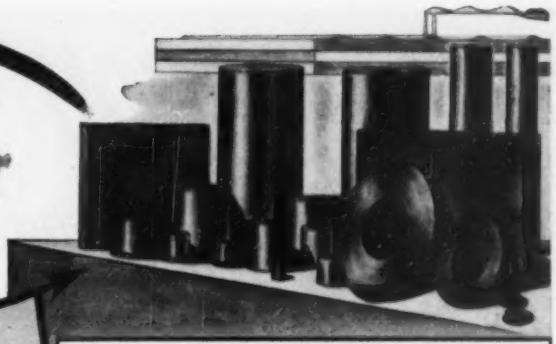

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POROUS BRONZE
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with Oil Film Always Present All Over

with FIVE
Outstanding Advantages:

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4. **BOST-BRONZ Bearings are easy to assemble and size.** Simple press fits without machining. Available in wide range of sizes, *from stock.*
5. **BOST-BRONZ Bearings have the quality and precision for superior performance.** They can be applied with confidence to heavy loads, light loads, high speeds, low speeds, static loads and shock loads.

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DIVISION OF HAMILTON-THOMAS CORP.
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avoid repetition of defective work. Functional services and systems, though they may be complete, cannot be perfect. It is still necessary that the foreman should provide the necessary human element at the point of contact with the worker to make adjustments, rectify errors that lead to spoiled and defective work, remedy deficiencies, interpret and administer instructions, supervise work, and, most important of all, provide personal leadership.

In the smaller shop, where the inspection function is not the responsibility of a separate department, the efficient foreman should be able to control defective workmanship through his own efforts. In the large plant, the control of spoiled and defective work presents a problem of greater magnitude than the individual foreman may be physically able to cope with.

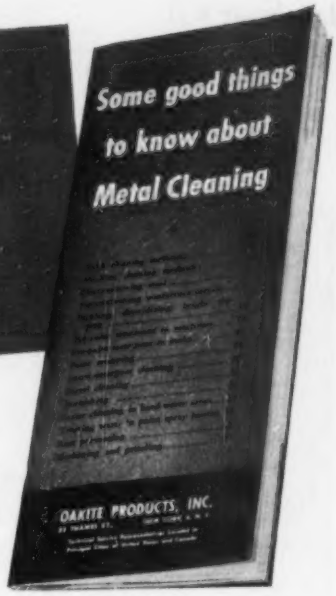
Any inspection system should certainly provide for tracing defects to the individual worker who caused them, and should provide some means of insuring against their recurrence. Such methods tend to make workers their own inspectors, and provide for the smoother flow of materials through the manufacturing processes.

When spoiled or defective work is brought to the foreman's attention, corrective action may be taken and performance held up to standards. The weak spots in the worker's production are thereby spotted and the foreman knows wherein his operations are falling down. He can then, by study, determine why they are below standard, and corrective procedures can be applied.

In his supervisor's attitude lies the answer to the problem of how a man's pride may be protected and spoilage controlled simultaneously. The foreman's actions speak louder than words, and by his actions the workers will make the necessary judgments as to whether or not they should come to him when they spoil a job. Unless the foreman is fair with the men and has created understanding there is certain to be deception and concealment of spoiled work.

Caching defective work hinders production. The foreman is responsible for production. It therefore follows that the foreman is harmed in his production efforts when the workers attempt to hide spoilage. To get production, the foreman must first of all have technical know-how, backed up by mechanical experience. But the only way he can get acceptable work done is by getting people to produce good work. He must make a constant effort to main-

Which of your metal-cleaning jobs would you like to improve?



Are you cleaning metal in the most economical way? ***See page 9*** **of Oakite's new FREE booklet on Metal Cleaning.**

Are you cleaning metal the fastest way? *See page 11.*

Can you clean brass anodically with no tarnish? ***See page 18.***

Can you clean steel and condition it for painting for less than 20 cents per 1,000 square feet? *See page 26.*

Could you use a cleaner that removes rust and oil at the same time; often eliminating all need for pickling. ***See page 28.***

Do you have trouble cleaning parts that are too large to be soaked in tanks or conveyed through washing machines? *See page 30.*

Does your burnishing barrel produce a luster you are proud of? ***See page 32.***

What do you do when the overspray neither sinks nor floats in the wash water in your paint spray booth? *See page 35.*

Do you dry steel parts before anti-rusting? ***See page 37.***

¶ Listed below are some of the operations discussed in this 44-page handsomely illustrated booklet. Please check the jobs in which you are interested. Then let us show you how Oakite materials and methods can give you better production with greater economy.

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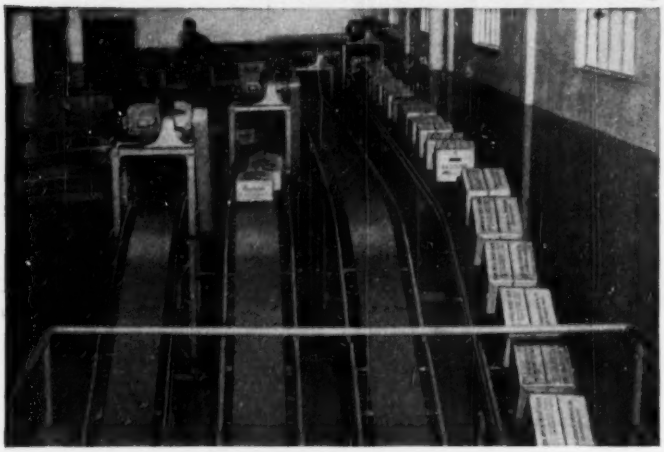
Fast Lower-Cost Handling



1 WITH ROLLER OR BELT CONVEYORS

— Order and cleanliness — freedom from congestion — smooth flowing coordinated movement of commodities — these are the plus advantages of roller or belt conveyors, gravity or power, in addition to their time, money, and manpower economies.

2 with the EXTENDOVEYOR

— compact, mobile, easily maneuverable power-belt conveyor unit—handles packages up to 150 lbs.—reaches into cars, trucks, trailers. Available in 4 sizes — 2 models.

3 with PORTABLE ROLLER CONVEYOR

— light, easy to carry and set up where needed. Standard Litewate Sectional Roller Conveyor is a great time and labor saver in loading, unloading, storing commodities. Available in 5 ft. and 10 ft. sections — straight and 90° or 45° curves.

4 with PNEUMATIC TUBE SYSTEMS

— provide swift, sure, safe transportation of messages, documents, blueprints, samples, small parts, money; cylindrical or oval tubes 1½ inch upward with dispatching and receiving terminals for complete systems to meet your needs. Write for special bulletin SPT.

Write for Standard's general Catalog AM-90. Tell us what you want to handle or name equipment on which you want more information.

STANDARD CONVEYOR COMPANY
North St. Paul 9, Minn.
Sales and Service in Principal Cities

Standard GRAVITY & POWER CONVEYORS

tain quality as well as volume of production, to do it safely, efficiently, and with fairness to himself, to his workers, and to management.

To impress employees with the importance of cutting down on scrap and waste, one company I know of exhibits spoiled work in the plant and in its employee paper, with the dollars-and-cents cost in big figures. The attention directed to the monetary cost of defective work has a sobering effect. It is also emphasized that quality is never an accident. It is the result of discriminating judgment and care which is brought to skillful execution through sincere effort.

Where there is good leadership and understanding there will be no need for the worker to decide whether to "cache or confess." He will know the truth of that Scottish proverb: "Open confession is good for the soul." Furthermore, "To confess a fault is the next thing to being innocent of it."

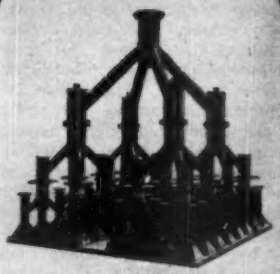
Harry Kaufman
Philadelphia

•

To CACHE away a damaged article is nothing short of dishonesty and should be eschewed by every man in whom the foreman has put his trust. The old saying: "What he doesn't know won't hurt him" may get a man by for the time being, but in time the old fellow with the horns will have him by the tail. An honest admission of having done something wrong certainly will result in a better understanding between the worker and the foreman as well as to be a potent factor in strengthening the character of the one who has guts enough to admit a wrong. To

"MAINTENANCE!"

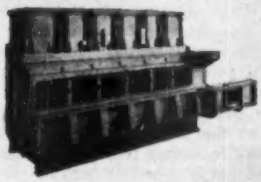
Steel-Weld FABRICATION



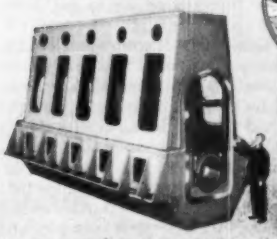
One of Several Parts of a Catalytic Cracking Plant Produced for the Petroleum Industry.

Pressure Vessels for the Chemical and Allied Industries.

Heavy Press and Machine Frames and Bases for the Machine Tool Industry.



Diesel Engine Crank Cases and Frames for the Marine and Electro-Motive Field.



Crank Cases, Frames, and other Parts for Manufacturers of Marine Steam Engines of Uniflow or Multiple Expansion Type.

Two Diesel Scavenger Housings, which were part of an order covering a number of such welded steel housings fabricated and completely machined ready for assembly by the Steel-Weld Division of The R. C. Mahon Company.

The Diesel Engine Scavenger Housings illustrated above are another example of Mahon advanced technique in Steel-Weld Fabrication . . . they are typical of thousands of Steel-Weld Fabricated parts and major assemblies produced by Mahon for manufacturers of heavy machinery and equipment throughout the country. You, may also find it advantageous to employ Steel-Weld Fabrication . . . if you do, and are interested in good workmanship, you will find in the Mahon organization an unusual source for welded steel in any form for any purpose—a source with modern fabricating and machining facilities, backed by a staff of competent design engineers and craftsmen from whom you may expect a smoother, finer appearing job, embodying every advantage of Steel-Weld Fabrication.

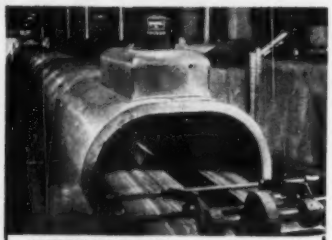
THE R. C. MAHON COMPANY
DETROIT 34, MICHIGAN

Engineers and Fabricators of Steel in Any Form for Any Purpose

MAHON

A TOLEDO "SPECIAL" may be YOUR answer...to control quality and cut costs!

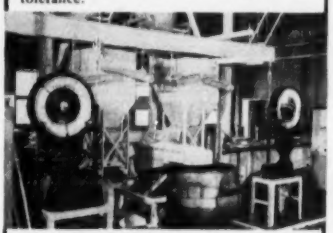
CONNECTING ROD BALANCERS... for balancing, standardizing and matching of engine connecting rods.



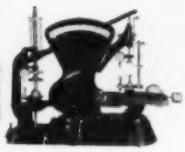
CONTINUOUS WEIGHERS... give an automatic and continuous check, during production, on the many materials manufactured in continuous sheet or strip form.

AUTOMATIC CARTON CHECK-WEIGHERS... detect shortages, overages or breakage by automatically checking each carton against standard weight; and rejecting those outside of tolerance.

DYNAMOMETER SCALES These Toledos give an accurate measure of torque delivered by a dynamometer, with a direct reading on dial.



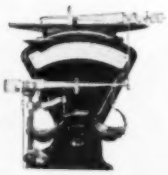
AUTOMATIC BATCH CONTROL. Groups of scales can be electrically interlocked for completely automatic batch control.



SPRING TESTERS ... for testing a variety of helical springs in both compression and tension.

REMOTE INDICATION... dial or graphic recorder can be on panel away from scale.

BOWLING BALL BALANCER... another Toledo designed for a special need!



COUNTING... fast, accurate Toledo counts of parts. Regular and special models for exact needs.

STOP ERRORS

Toledo Printweigh Scales provide printed weight records... assure you that the accurate indication of the Toledo dial will reach your accounting records without chance of human error.

If you have a "production puzzler" in force-measuring, balancing, counting or material control... Toledo experience, based on a very wide range of custom-built applications of weight control principles throughout industry, may offer the solution for you. All Toledos—whether "specials" or the complete selection of standard models—bring you outstanding performance in accuracy, dependability and speed. Write for recommendations on a special application... or for a catalog of standard models. Toledo Scale Company, 1100 Telegraph Rd., Toledo 1, Ohio.

TOLEDO

HEADQUARTERS FOR SCALES

hell with your ego; it'll survive the storm and you'll be stronger for the buffeting. The actions of the worker usually reflect the fairness or unfairness of the foreman. We have both kinds to contend with but thank goodness that the latter are in the insignificant minority.

If one is forced, through economic necessity, to work for a man who is unscrupulous in his conception of what's right, who can blame the poor fellow for pulling a fast one? This isn't consistent with the above philosophy by any means but hell, shop men aren't sprouting wings just yet — their jobs will, though, unless some strong character comes along to lead them to think that giving is just as important as taking.

Caching spoiled work, whether it be in the garbage can or out the window, is not the remedy for the situation. It is not according to the dictates of Safety First for one thing. Pity the poor Porky trying to get a spoiled 2-in. pipe tap past his gullet box, or perchance the innocent pedestrian who happens to be passing the shop at the time of the dark deed!

Who cares a damn about a man's pride if he is so warped out of shape as to slip a damaged piece under cover in order that his mistake will go unnoticed? It usually is up to the foreman to ascertain the cause of damaged work. Sometimes it is the fault of some machine.

I know of a universal tool grinder, that was part of the equipment in a well-ordered toolroom, which, because of the need of an overhauling, caused the men many a "headache" until they were out of it with their finished work. Finally, after a number of jobs were spoiled, through no fault of the men, the irregularity of the machine was corrected. It may be that the foreman procrastinated too long in having the grinder overhauled but it is certain that no man cached any spoiled parts. He lost no time in presenting the evidence to the foreman so as to get some action on the repairs.

A fellow will slip up occasionally, of course, but you'll find that unless the workman is habitually careless, he'll be like the driver of a car who has had the red light warning shown on him. The foreman would like to know where the leaks are in his department and it's a certainty that they cannot be detected if an unfair worker resorts to underhand means of covering up his weaknesses. It isn't fair to the other workers to have one "pull the wool" over the foreman's eyes. A poor worker will soon rise from that class by openly admitting his failures. Naturally the fellows are

REEL FACTS
PRODUCT: Fishing Reel
MATERIAL REQUIREMENTS: High Corrosion-Resistance; Precision Machining Characteristics
MATERIAL USED: Republic ENDURO Stainless Steel, Type 303 Free Machining Analysis (other ENDURO Analyses used for stampings and gears).
RESULTS: Very Good. No difficulty encountered in machining intricate parts shown below.

Smooth-running as a fine watch, this fishing reel is one more in the never-ending list of products made of Republic ENDURO *Free-Machining* Stainless Steel.

Here, again, the unsurpassed corrosion-resistance of stainless steel is coupled with the accuracy of section, smooth surface finish and UNIFORM MACHINABILITY which result from Republic's Union Drawn process of cold finishing. And another manufacturer builds highest quality into his product—at a cost which permits him to be competitive.

Free-Machining ENDURO Cold Finished Bars, as well as hot rolled bars and wire, are available for immediate delivery. Write today for specific information and prices.

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
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Export Dept.: Chrysler Bldg., New York 17, N.Y.

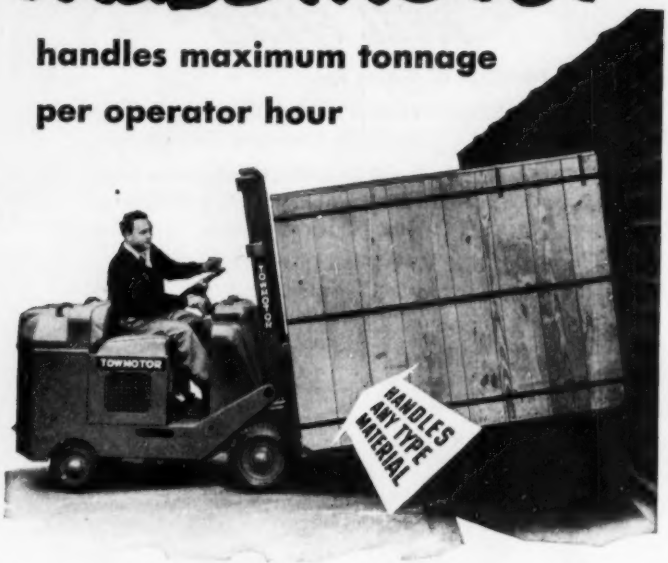
Republic ENDURO FREE-MACHINING STAINLESS STEEL

REPUBLIC STEEL

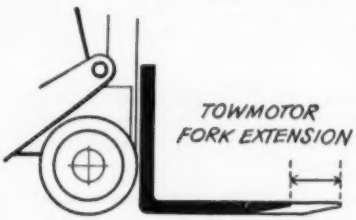
Other Republic Products include Carbon and Alloy Steels—Pipe, Sheets, Strip, Plates, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing

Mass Mover-

handles maximum tonnage per operator hour



With engines constructed especially for heavy-duty industrial use, with plenty of power to spare even for the heaviest loads, Towmotor cuts 20% to 30% from your production costs. Compare industry's fastest working fork lift truck with any other lift truck and you will see why Towmotor's rugged features make every **M**ass **H**andling job easier, faster, safer. Write for a copy of "Handling Materials Illustrated." Towmotor Corporation, Div. 56, 1226 E. 152nd St., Cleveland 10, Ohio. Representatives in all Principal Cities in U. S. and Canada.



FORK EXTENSIONS
. . . another Towmotor efficiency feature

Permit a temporary extension of the regular forks for unusually large loads. Easily removed for regular handling assignments requiring standard length forks.

every handling job is easier with Towmotor MH!

TOWMOTOR
THE ONE-MAN-GANG ®

FORK LIFT TRUCKS and TRACTORS

RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

going to chip in and give him a hand if he shows the right kind of stuff. It is a cinch that he's not going to get very far if he resorts to caching.

J. Homewood
Ontario, Calif.

•

SOME PEOPLE seem to think that truth is out of place in this day and age. Every plant has spoiled work, but, in the best ones, the percentage is very low.

This may not be wholly up to the workman, for a piece may have a flaw which is unseen when it is in the rough state and a number of operations may have been done before this defect comes to light.

Back in the 1890's it seemed that all executives, including foremen, thought that all men, especially apprentices, were crooked and they were so treated.

However, in one shop, there was one boy, who, on every occasion proved to be absolutely honest, and those with whom he worked thought so too.

One day he took a ¾-in. tap from the tool crib, but, upon attempting to use it, the tap broke about one half way up the threaded length. He returned the tap to the tool crib and explained the matter to the man in charge. A close examination showed that the tap had been previously broken and had been glued together.

The man said, "Boy, I believe you, and if more boys were like you, we would all be better off."

Now the attitude, disposition, yes, and even the voice of a foreman may be such that he kills any confidence which his men may have in him, which causes them, when any of them spoil a piece of work, to cache it by kicking it under a bench or disposing of it in any way, all of which is anything but the square thing to do.

Ed has decided to hold conferences with his men. Does he ever think that, had he been able to establish the right relations with his men, their attitudes would be such that these talks would be unnecessary? However, as long as the matter stands as it does, Ed is wise to limber up relations.

Events of this or similar character crop up in many shops.

The consensus of opinion is that 90% of the people are honest, so let's hope that we can instill the element of truth in the remainder of them.

F. H. Stebbins
Worcester, N. Y.

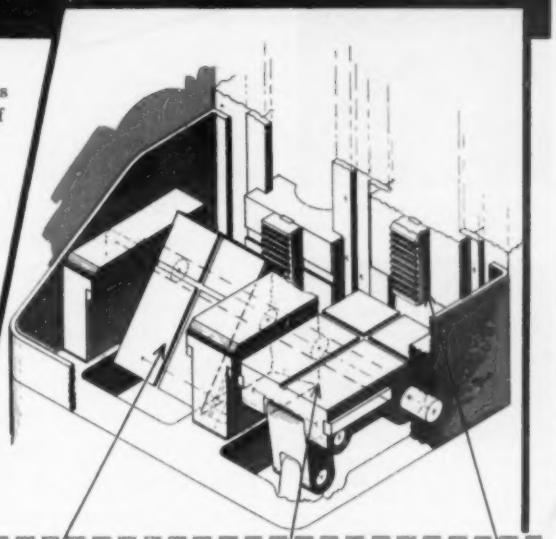
What engineering features are responsible for LAPOINTE LEADERSHIP in building *BROACHING MACHINES*?

A broaching machine is only as good as its fixtures. We present, here, the impressive story of the *new and improved* Lapointe

TIP-DOWN FIXTURES

which are standard equipment on all our single and double ram vertical surface broaching machines.

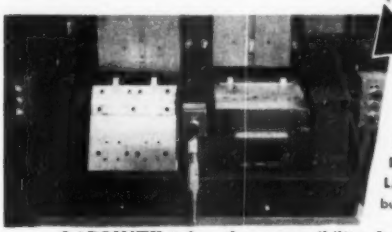
1. Accurate, fast, versatile — they will handle 80% of all surface-broaching requirements.
2. Convenient to load—eliminate fatigue.
3. Utilize full stroke of machine.
4. Permit use of a great variety of work holders that can be manually or hydraulically clamped.
5. Allow use of fully adjustable work holders to compensate for broach wear.
6. Safe to operate.
7. Sturdy and rugged.



TIPS DOWN into convenient position for loading and unloading, with locating points in clear view of operator for fast part handling.

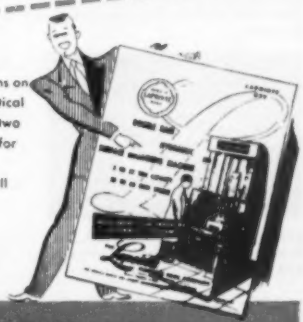
TIPS UP for broaching, with sturdy, rigid support locked securely against hardened and ground stops on both sides of trunion blocks.

Utilizes full stroke of the machine!



COMPLETE ENGINEERING DATA and dimensions on double ram and single ram LAPOINTE Vertical Broaching Machines will be found in these two illustrated bulletins. You are invited to send for Bulletins **DRV-2** and **SRV-2**.

LAPOINTE Vertical Broaching Machines are all built to JIC Standards at no extra cost.



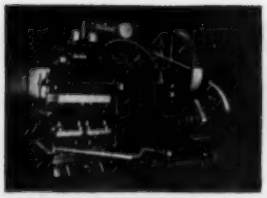
LAPOINTE takes the responsibility for the entire job — machines, tools, and fixtures. That's a big reason for Lapointe Leadership . . . that's why "Lapointe's the way to *better broaching!*"

THE Lapointe MACHINE TOOL COMPANY

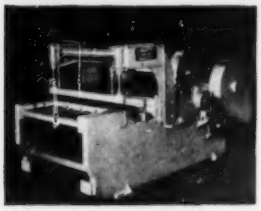
HUDSON, MASSACHUSETTS • U. S. A.

Branch Factory • Edgware • Middlesex • England

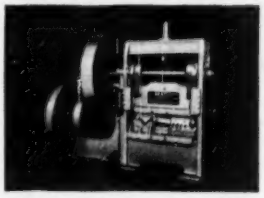
THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES



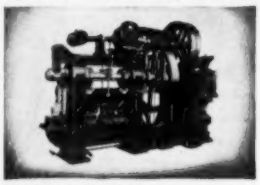
BEATTY No. 11-B Heavy Duty Punch widely used in the railroad industry.



BEATTY Horizontal Multiple Punch for flange punching of long, wide sheets.



BEATTY Guillotine Bar Shear shears angles, rounds, bars and squares without changing tools.



BEATTY CoPunShear — one compact unit does coping, punching, shearing.

BEATTY Spacing Table handles flange and web punching without roll adjustment.

BEATTY
BUILT MEANS BETTER BUILT

BEATTY *engineered* means better *engineered* to handle a specific metal working job. That is why you'll find custom-built BEATTY machines in hundreds of important plants — forming, bending, flanging, punching, extruding, shaping, bulldozing.

This broad BEATTY experience is your assurance of expert counsel, advanced engineering, quality construction. This experience is assurance that BEATTY engineers are most apt to come up with the answer to your problem.

There is a better way to handle any heavy metal fabricating problem. Let us help you find that better way.

HYDRAULIC HEAVY METAL WORKING EQUIPMENT

BEATTY MACHINE AND MFG. COMPANY
HAMMOND, INDIANA

Are shops still faced with this problem? In the past years before strong labor unions were formed, which now control about 95% of all the hourly working class, this problem was a serious one. I have known of shops where to spoil work meant signing one's dismissal the next morning, or at least a dock in pay. Therefore the practice of dumping the spoiled part was started.

The employee knowing full well that the boss didn't know how many pieces he was working on, would slyly throw the spoiled piece away. Since no control of actual input or output was available, the workers could easily cover up all mistakes.

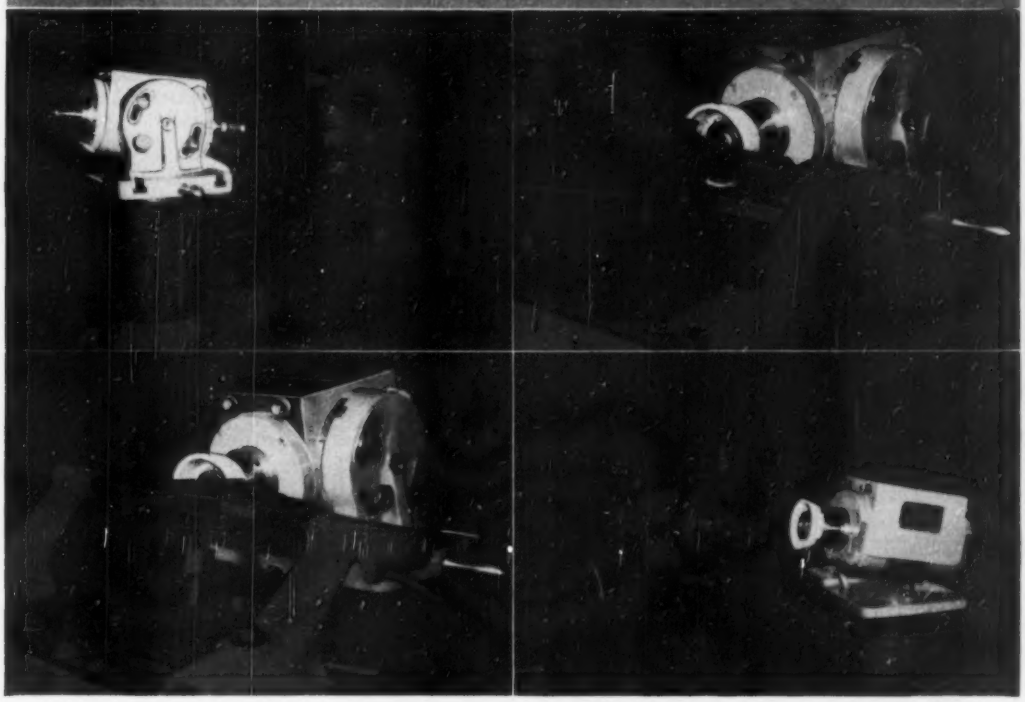
But do we face this particular problem today? Under present management how can a worker throw away a product? Controls today account for all items being produced. Labor must report all parts worked on, either good or bad. Inspection controls the bad product. Furthermore, we are now unionized and what has the worker to fear? No employee can be fired for spoiling one piece. It takes months and sometimes years to build up a case under today's unionized shops. A case that will actually stick in a grievance case is one where management must have the facts and figures.

If the problem does exist, then the best solution is for a thorough understanding between shop workers and management. Written rules signed by both parties to govern such things as spoilage should be established. Foremen should not turn their backs on poor parts—they should find out why they were spoiled. Maybe it is not the worker's fault. Perhaps it is the faulty equipment in use. Perhaps the worker is not suited to the job he is on and would do better work on another assignment. Every fore-

"Ok, who's the wise guy?"

NEW with new adjustment

This POPE Motorized Tool and Cutter Grinder SPINDLE



Here's one you've always wanted — a totally enclosed, sealed lubrication, super precision 1 HP, 3600 RPM motorized tool and cutter grinding head, mounted on a new bracket that provides *angular adjustment in a vertical plane.*

POPE Spindles have the radial and axial rigidity to make wheels cut faster — spark out quicker. Grinding time is reduced. Softer wheels can be used for cooler grinding and for producing the kind of cutting edge that stands up.

Make the most of your present grinders. Equip them with this new and better POPE Spindle.

Ask us to quote price and delivery.

SPECIFY THIS POPE SPINDLE ON YOUR NEXT TOOL AND CUTTER GRINDER

No. 71

POPE

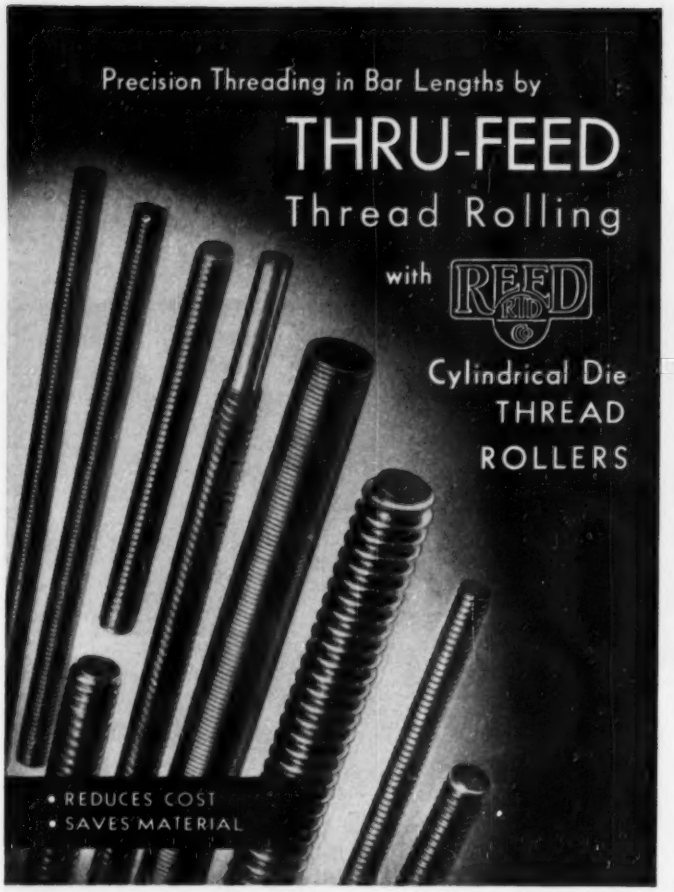
TRADE MARK REG. U.S. PAT. OFF.

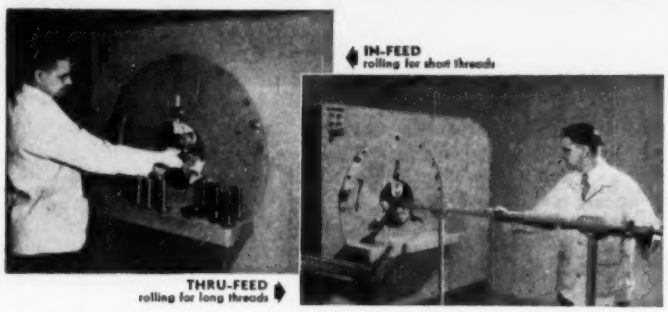
POPE MACHINERY CORPORATION

ESTABLISHED 1926

261 RIVER STREET • HAVERHILL, MASSACHUSETTS

BUILDERS OF PRECISION SPINDLES





Send us specifications of your requirements and let us supply you with complete information.

REED ROLLED THREAD DIE CO.

Manufacturers of

THREAD ROLLING MACHINES AND DIES • KNURLS • THREAD ROLLS

Worcester 2, Massachusetts, U.S.A.

AM-018

man should try to place his workers on the jobs best suited for their particular capabilities. You may comment that this is not easy to do. That may be true, but if we are to succeed in building up our country on free enterprise, it is time that management and labor both get down to facts of operating a business. Two sides to every story and until labor and management stop playing that each is the injured party, and study the two sides of the problem, we will always have chaos.

Workers today having nothing to fear, turn in their scrap reports without the threat of punishment or dismissal because they were responsible for the spoiled parts. They know that records will be kept and management knows who has a high scrap record and who doesn't. But the worker also knows that due to the unionization of the shop, management must give him a square deal regardless of his scrap record.

Charles D. Townsend
Ft. Wayne, Ind.

•

EMPLOYMENT PREVIEW

ONE OF the great advantages of the employment expert is that he is aware of the requirements in every department of the plant, where the foreman of a department is only interested in his own requirements. Also there are times in most shops where a workman don't seem to get along well with his immediate foreman. Either the foreman or the man can, rather than separating, talk to the employment office about transferring to another department, which is, of course, a far more satisfactory solution than the employee feeling he has to leave.

There is another important point to where it is a decided advantage for the foreman to talk to an applicant for a position, and that is if the foreman approves of the man and he starts work. He, the foreman, will certainly take more interest in having a new man make good, and help him to do so, thus proving his good judgment in employing him, than if the man failed. On the other hand, if the man was only interviewed by the employment specialist, Ed obviously would say, the responsibility for the man's failure to make good rested on their shoulders, as the man was not suitable in the first place.

As a matter of fact, it was the very condition of things where I was employed in a huge plant that caused the management to grant the supervision the right to an interview with any machinist, who if employed

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came under their supervision. So after the employment expert had interviewed applicants and thought any of them desirable employees, they were then sent into the shop where help was needed, and talked to the chap who would be their supervisor.

The decision of the management in that plant certainly proved highly favorable in every way. There were fewer misfits in the selection of personnel, in the right kind of machinist for the work to be done. Naturally, this was reflected in less turnover of labor, and in a plant of around 6000 employees, this means a large saving of money, and certainly, fewer headaches, for the supervision and more harmonious relations between employment office and themselves. This is absolutely necessary for efficiency. In cases where employment offices and top supervision do not work close as a team, efficiency suffers. Often in the past ten years a clerk from the employment office has brought along a machinist who, as soon as he saw the heavy machinery and the job to be done, would just turn his back and walk out. He had been interviewed and okayed by the employment expert. If that executive had had shop experience, or had the foreman talk to the prospective new man, such an incident would be eliminated.

In conclusion, employers have found out that a college education, course in human relation, a good appearance, fluent speech, plus brains —generally the qualifications formerly considered sufficient to qualify for employment specialist—are now insufficient. In lots of instances where an employment specialist is required, one stipulation is they must have had quite a little experience, actually gained by working with either their hands or brains out in the shops. It is my belief that a couple of years practical work along with Al or Ed would prove to be, for the future employment specialist, the biggest and most helpful asset insuring his success. He will seldom be in doubt as to whether some applicant for work is misleading him.

Arthur Silvester
Niantic, Conn.

•

WHEN MEN or women seeking employment approach a well-organized personnel department, they are shown due courtesy and are put at their ease so the interviewer can learn the many points about their past experience.

Then, if there is an opening for a man or a woman in a certain depart-

Guard Against Atmospheric Hazards...

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PROTECTED MOTORS

Drip Proof

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AC, .63 to 250 KVA
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AC to DC, AC to AC
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Ball Bearing motors are factory lubricated for several years' normal service. Bearing housing construction permits easy re-lubrication when unusual service demands it.

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To guard your production against the destructive effects of atmospheric hazards, Century offers four types of protective motor frames.

DRIP PROOF—meets the requirements of most installations. Use it where operating conditions are relatively clean and dry. Top half of the frame is enclosed to keep out falling solids and dripping liquids.

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ment, he or she is conducted to the party in charge of it, a further interview takes place at which time there may be a three-cornered discussion between the party in charge, the representative of the personnel department and the candidate.

However, many of these discussions are simply between the foreman and the candidate.

Let's take the case of a man who sought employment with one of the largest air lines.

As Mr. "A" entered the offices of the company, a pleasant young lady approached him and asked, "Can I help you in any way?"

He replied that he was seeking employment in the plant engineering or maintenance department.

The young lady said, "Mr. X will be glad to talk with you in a few minutes. He is the man who sees the applicants for that department."

Mind you, she didn't say, Mr. X is busy; you'll have to wait," in a patronizing attitude, but there was a display of courtesy and a psychological bearing which put Mr. A at his ease.

When he approached the desk where Mr. X was seated, the latter invited Mr. A to be seated, then he made a few pleasant remarks and the interview began.

He asked a few questions of "A" and said, "Perhaps you will like to sit at that table [about four feet away] and fill out our form and so outline your experience and especially state any points which refer to plant engineering and maintenance work."

Then further Mr. X said, "If there are any questions on the form about which you would like more information, feel free to ask me about them."

While the form was being filled out, there was an opportunity for Mr. X to interview another applicant.

When the outline of A's experience was completed, Mr. X looked it over, made notes on the several items of value to the subject in question, then phoned the plant engineer, for he knew there was a vacancy in the plant department.

The plant engineer agreed to talk with "A" at 11 am the following day.

Mr. A was requested to call on Mr. X the next day at 10 am to have a further discussion.

Mr. A did so, and Mr. X accompanied him to the office of the plant engineer; and there he talked with Mr. P who cordially shook hands and asked the two to be seated and discuss the matter in hand.

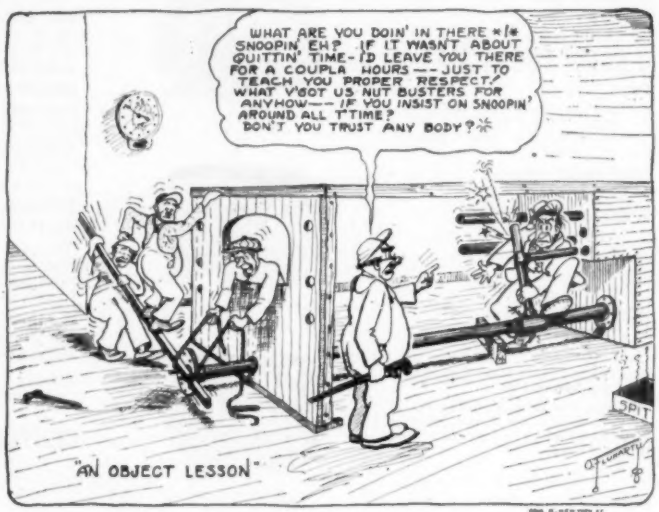
Result, Mr. A felt at ease and freely discussed his experience in former positions and offered references to whom they could write and make inquiries.

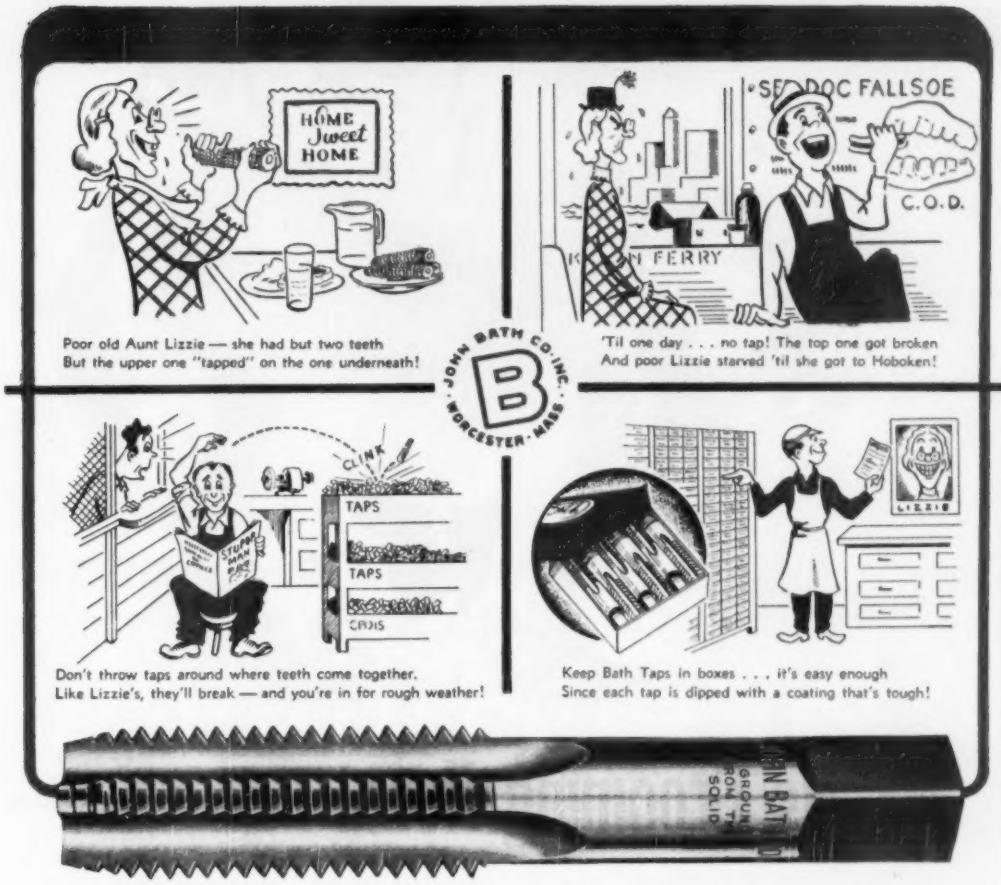
Such a free, honest and aboveboard conference had the desired result, for the regulations of employment salary, etc., were settled and Mr. A began his duties on the first of the following month.

A good personnel man must have a talent for the work in such a position. Above all he needs tact, then patience and perseverance in abundance, courtesy, and he must be manly in every way.

Yes, Ed's idea of a foreman-candidate interview is OK.

F. H. Stebbins
Worcester, N.Y.


WHAT ARE YOU DOIN' IN THERE *!* SNOOPIN, EH? IF IT WASN'T ABOUT QUITTIN' TIME-I'D LEAVE YOU THERE FOR A COUPLA HOURS--JUST TO TEACH YOU PROPER RESPECT! WHAT D'YOU US NUT BUSTERS FOR ANYHOW--IF YOU INSIST ON SNOOPIN' AROUND ALL T'TIME? DON'T YOU TRUST ANY BODY?*
SPIT
"AN OBJECT LESSON"


HOME Sweet HOME
Poor old Aunt Lizzie — she had but two teeth
But the upper one "tapped" on the one underneath!
JOHN BATH CO. INC. WORCESTER MASS
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'Til one day . . . no tap! The top one got broken
And poor Lizzie starved 'til she got to Hoboken!
CLINK
TAPS
TAPS
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Don't throw taps around where teeth come together.
Like Lizzie's, they'll break — and you're in for rough weather!
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Keep Bath Taps in boxes . . . it's easy enough
Since each tap is dipped with a coating that's tough!

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Keep your Bath Taps conveniently stocked in the original containers on your shelves. They'll be easy to identify and in perfect condition for instant use.

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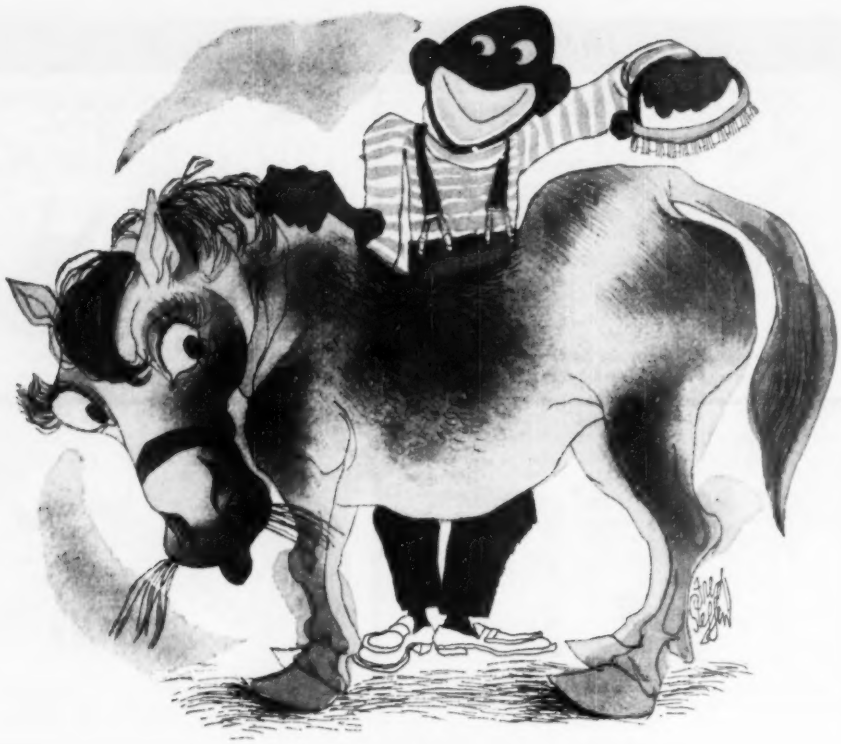

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For Engineering, Tooling, Contract Manufacturing

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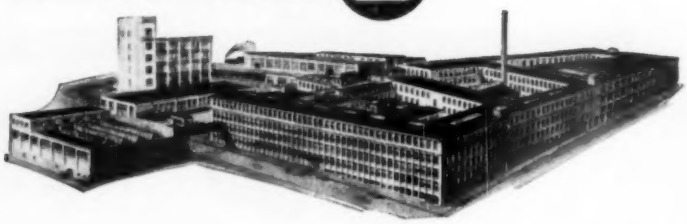

MODEL 470 FULLY AUTOMATIC ABRASIVE CUTTER

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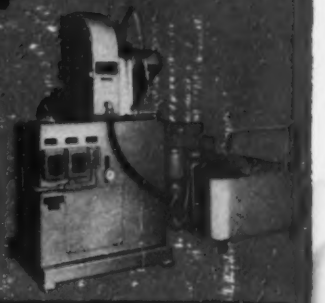
CUTTING AND NIBBLING
MACHINES



MODEL 223 ABRASIVE CUTTER

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NIBBLING The efficient way to cut irregular shapes out of sheet steel (up to ½" mild steel, 5/16" stainless) where quantities do not justify making a special die. CAMPBELL offers a wide range of models for tool rooms, machine shops, experimental departments, sheet metal departments, production lines. Multiple speed and adjustable stroke provided.

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Mac-it Hollow Pipe Plugs —for accuracy, safety, uniformity and strength.

BETTER, FASTER SERVICE WITH THIS *COMPLETE* MAC-IT LINE!

Because many standard types of Mac-its are stocked throughout the country for quick delivery, and because specials can be engineered to your own specifications, you'll find it pays to investigate Mac-its *first*.

Mac-it's 35 years' experience in the manufacture of heat-treated, alloy steel screws is your assurance of precision, uniformity and strength. Sold through leading industrial distributors from coast to coast and in Canada. Write for new catalog today!

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How to meet a payroll (at a cost of $3.19)

Twenty-four hours before factory payday, another check-writing machine was needed *fast*. At 10 A.M. plant manager ordered one from supplier 400 miles away. He specified Air Express, the service regularly used to keep production rolling. 26-lb. carton delivered same day at 2 P.M.—in time! Shipping cost only $3.19!

$3.19 was total cost —and *included* door-to-door service! Air Express is the most convenient way for you to ship or receive —in addition to being the world's fastest transportation method.

You get round-the-clock service with Air Express. Shipments go on all flights of the Scheduled Airlines. Air Express is service you can *count on* to keep your business rolling in high gear.

Air Express gives you all these advantages

World's fastest transportation method.

Special door-to-door service at no extra cost.

One-carrier responsibility all the way.

1150 cities served direct by air; air-rail to 18,000 off-airline offices.

Experienced Air Express has handled over 25 million shipments.

Because of these advantages, regular use of Air Express pays. It's your best air shipping buy. For fastest shipping action, phone Air Express Division, Railway Express Agency. (Many low commodity rates in effect. Investigate.)

AIR EXPRESS GETS THERE FIRST

Rates include pick-up and delivery door to door in all principal towns and cities

A service of Railway Express Agency and the **SCHEDULED AIRLINES of the U.S.**

"Did I ever tell you about my 18 operations?"

"Eighteen! That's a lotta operations on any anatomy. But these were not the hospital kind. They're the basic manufacturing operations that have given Nicholson and Black Diamond files the reputation of being the toughest, bitingest, lastingest files made.

"But the agonies I went through to get that way! Even as a raw strip(ling) from the steel mill, Nicholson had a finger in my welfare—specifying the kind of stuff I had to have 'fore they'd consent to operate on me. At the warehouse they put the steths on me and my buddies. We hadda be right. Or else! Then to a clip joint where we were measured for size and our first knifing. Whammie! Everything went blank. *I* was a *flat* blank (no teeth).

"Checked against a model—a tattletale if I ever saw one—I hit the forging room. They turned on the heat—to soften me up. Notched me where my heel was to be. Fashioned one end of me into a tail (tang, they call it). More heat, and I'm rammed into a die for another 'do-or-die' operation. When I came out, *voilà!* I had myself a nice tapered point. Hurt? Me? You forget, sir, that I can take it.

"Now they tell a batch of us blanks we gotta be annealed—to tone us up so we can have our teeth knocked in. More torture. Some of us came out of the oven looking like we'd been on a bender. After being straightened out and cooled, a few of the fellas were eenie-meenie-minied to make the supreme sacrifice. A bone cracker broke 'em smack in half. With magnifiers the fractures were searched for bugs in the grain of the steel. Our batch got a clean bill. 'But you never can tell,' said the inspector.

"Next, off to the grinding and drawfiling rooms to get our backs, sides and bellies smoothed . . . so all our teeth would be of even height and their points sound and clean as a hound's tooth. Not a molecule of decarburization was to remain. Very fussy, those Nicholson folks. They'd remove a flyspeck if it indicated the slightest letdown in Nicholson quality.

"There's that model again. Check. Okay, and we're headed for the cutting room. Here come the slashers—murderous-looking machines with ver-r-ry sharp chisels poised for the kill. This was *it*. I either make it or I don't. I was laid on a nice, soft zinc operating slab. In a few seconds it was all over. A thousand gashes—but I had a fine set of teeth. We lost a few of my buddies—because here at Nicholson only the fittest survive.

"I was a bit flabby from the annealing. They fixed that. Gave me a bath. Told me it was a mud bath, but it smelled like old ground-up bones. Another heat treatment—in red-hot lead; and another quick bath in a tub of cold water. I blew off some steam, but came out hard as nails. Another bath, and another (I was ready to scream). First a cleansing bath, then a lime-water.

"More. They took us unscathed patients to another operating room and sand-blasted the ugly film off our teeth. Boy, were they sharp and glistening! I thought I was ready to go places. But no, we gotta have another hot poultice—to take the brittleness out of our tangs. And another bath—in oil-and-water. Ugh! The oil was to protect us after an oven dried up the water.

"We hop a conveyor for the final tests. A prover gives us the cold steel—hard as aitch—to see if we can bite keenly and evenly. I gave him plenty of evidence! Then I was picked up and had my shoulder banged on a metal block to see if I was sound (no hidden fire cracks). I passed, was wrapped, boxed and ready to meet you through your industrial distributor. I'm a Nicholson Flat File that'll win your smile when you feel my bite and note my fine physical condition and long-lasting toughness.

A. Nicholson File

"P.S.—If you or any of your key men want to read more about files, write for 'FILE FILOSOPHY,' Nicholson's famous 48-page book jam-packed with interest. It's *free*—as many copies as you need. Address NICHOLSON FILE CO., 29 ACORN ST., PROVIDENCE 1, R.I. (*In Canada, Port Hope, Ont.*)"

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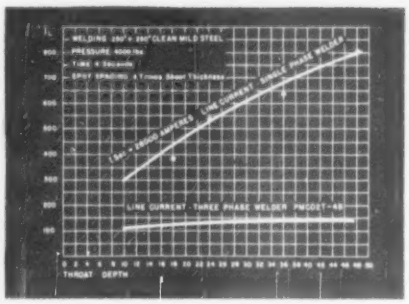
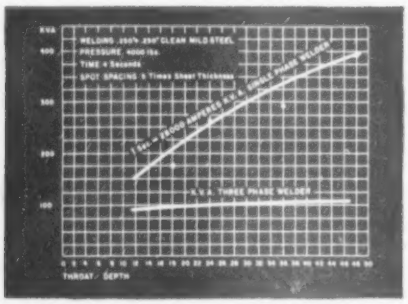
RESISTANCE WELDING

THREE PHASE

1. **Makes it possible for almost any plant to have the benefits of resistance welding regardless of power facility limitations.**
2. Reduces KVA demand 75% or more.
3. Provides balanced load on the power line.


WELDING .250"+.250" CLEAN MILD STEEL
PRESSURE, 4000 lbs.
TIME 4 Seconds
SPOT SPACING 4 Times Sheet Thickness
LINE CURRENT-THREE PHASE WELDER
THROAT - DEPTH

Above—Graph showing line current versus throat depth for single-phase and three-phase welders.



Above—Graph indicating ratio of line current of a single-phase welder to the line current of a three-phase welder, and the ratio of KVA single-phase against three-phase.

DON'T let power limitations prevent you from having the production-increasing, cost-saving benefits of resistance welding. The *original* SCIAKY Three-Phase resistance welding principle is your answer. It achieves balanced three phase load at near unity power factor, lets you use resistance welders without overloading the power supply.

Let a Sciaky engineer discuss this subject with you and your power engineer or a representative of your local power company. There is no obligation.

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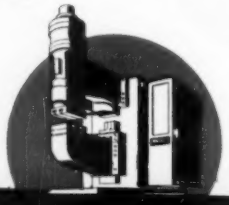
4919 West 67th Street, Chicago 38, Illinois

Send for these Bulletins

Complete technical information and a description of the benefits of SCIAKY Three-Phase Resistance Welding are contained in BULLETINS 136-A and 137-A. SEND FOR YOUR FREE COPIES TODAY.



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Ready-made, standardized, interchangeable units. Sturdy, welded construction lasts longer, minimizes maintenance.

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CARRY-TOOL, the handier tool stand.

STEEL STOOL. Strong, welded construction.

FOREMAN'S DESK OF STEEL

STEEL POSTURE STOOL with adjustable back.

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Knurled, slip-proof cap screw heads speed assembly. *Knurled* points make set screws self-locking . . . "they won't shake loose!" Advanced manufacturing methods make UNBRAKOS stronger, tougher, more reliable.

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KNURLED POINT, *SELF-LOCKING* SOCKET SET SCREW

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FLAT HEAD SOCKET CAP SCREW

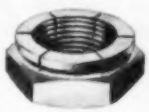
DRYSEAL PRESSURE PLUG

FLEXLOC

SELF-LOCKING NUTS

One-piece, all-metal, for maximum strength—minimum trouble. Positive, *automatic* locking. FLEXLOCS serve as both *stop* and *lock-nuts*. "Positively won't shake loose."

SELF-LOCKING STOP NUT, REGULAR HEIGHT



SELF-LOCKING STOP NUT, "THIN"

EXTERNAL WRENCHING, *SELF-LOCKING* STOP NUT

See us at Booth 2434, Convention of National Metal Congress and Exposition, Chicago, October 23 to 27.

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STANDARD PRESSED STEEL CO.

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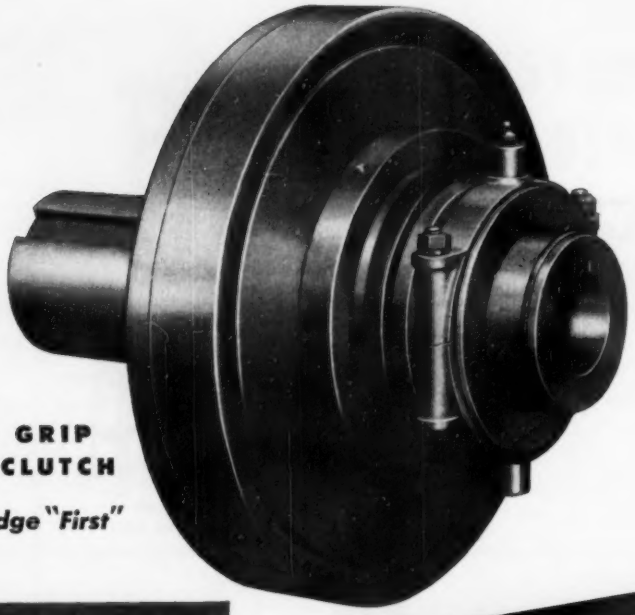

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—another Dodge "First"

It's Compact—
It's Flexible—
It's Smooth—

NO TOGGLES!

New and simplified design results in new ease of control, together with positive drive and extreme ruggedness. Dodge Rolling Grip Friction Clutches provide trouble-free, dependable service on many thousands of industry's tough installations.

There are no toggles! Instead, the mechanism shifts smoothly on hardened steel balls—and has the positive grip of a wedge. Operating parts are completely enclosed for safety, yet quickly accessible for service.

Dodge Rolling Grip Friction Clutches are available from distributors' stocks in two types—Bolted Plate and Gear Tooth Mechanism—for service ranging from light machinery with smooth power source to heavier loads, in a range from ⅓ H.P. to 21 H.P. at 100 R.P.M. Selection of the right size is easily arrived at from Dodge Selection Tables. For complete data, including tables, call your Dodge Distributor or write us.

Call the Transmissioneer, your local Dodge Distributor. He's factory-trained to help solve your power-drive problems. He has information on latest transmission developments. Look for his name under "Power Transmission Machinery" in your classified telephone directory.

DODGE MANUFACTURING CORPORATION, 100 Union Street, Mishawaka, Indiana

DODGE

of Mishawaka, Ind.

FIRST IN POWER TRANSMISSION MACHINERY

NAME PLATES

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, ETCHING COMPANY OF AMERICA, 1520 MONTANA STREET, CHICAGO 14, ILLINOIS

Saved $18.00 a TON

OVER HOT-ROLLED, HEAT-TREATED 4150 ALLOY STEEL

STRESSPROOF®

STRESSPROOF PROVIDES 4 QUALITIES IN 1 BAR

1 ELIMINATES HEAT TREATING
Its *in-the-bar* strength, as received, is twice as great as ordinary cold-finished steel shafting.

2 ELIMINATES CASE HARDENING
Its resistance to wear, as machined, is sufficient to replace many heat-treated or carburized steels.

3 MINIMIZES WARPAGE
Because it is *stressed-relieved*, it assures the user a minimum of distortion.

4 SPEEDS UP MACHINING
Has *in-the-bar* machinability fully 50% better than heat-treated alloys of the same hardness.

MACHINABILITY REDUCED 50%

This main screw for a self-lowering jack was originally made from hot-rolled, heat-treated 4150. Machining was slow. Tool life was short. Excessive warpage developed in machining, resulting in costly straightening and rejects.

When STRESSPROOF was used for the part—at a saving of $18.00 a ton in steel cost—these troubles virtually disappeared. Machining speeds rose 50%. Heat treating was completely eliminated. Tools lasted longer, and labor costs dropped 19%. Result: a finished part of better quality—costing 14% less!

Cost-wise manufacturers all over the country are realizing savings such as this—and more—because of STRESSPROOF's unique combination of four important qualities *in-the-bar:* Strength . . . Machinability . . . Wearability . . . Minimum Warpage. Yet STRESSPROOF costs little more than ordinary cold-finished bars. Available in cold-drawn or ground and polished finish.

Stocked by Leading Steel Warehouses

SEND FOR ENGINEERING BULLETIN

LaSalle Steel Co.
1416 150th Street
Hammond, Indiana

Please send me your STRESSPROOF Bulletin.

Name_____

Title_____

Company_____

Address_____

City_____ State_____

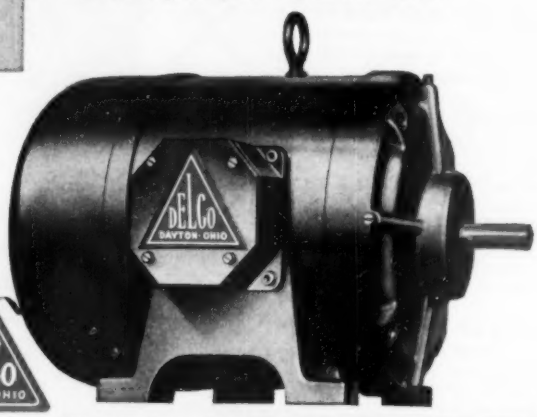
On more and more spec sheets . . .

Delco preferred!

- Positioned Bearings
- Delcote Coil Insulation
- Corrosive-Resistant Cast Iron Frame
- Positive Lubrication
- Dynamically Balanced Rotor and Shaft Assembly
- Water-Tight Conduit Box

Two words that mean top motor performance

You see the words "DELCO PREFERRED" on more and more spec sheets. That's because Delco motors are built the way production men want motors built. They are rugged, dependable, and made of the finest materials. A few of the performance extras that Delco motors give you are listed here:



Get complete data on Delco motors. Call or write Delco Products, Dayton, Ohio . . . or get in touch with the nearest sales office listed below.

DELCO
DAYTON OHIO

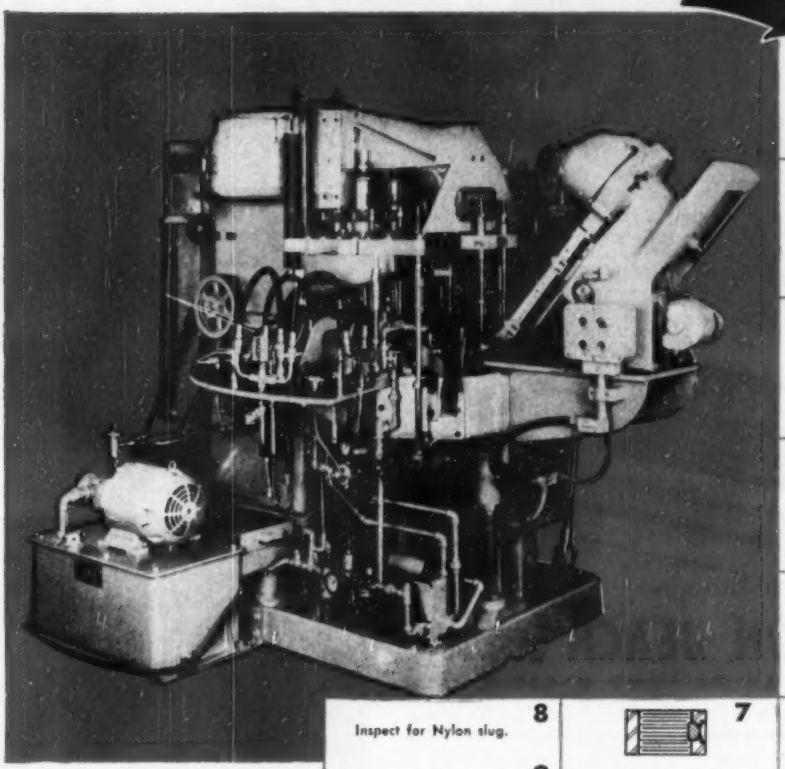
DELCO MOTORS

DELCO PRODUCTS, DIVISION OF GENERAL MOTORS CORPORATION, DAYTON, OHIO

SALES OFFICES: CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT • HARTFORD • PHILADELPHIA • ST. LOUIS

Bodine CASE HISTORY NO. 26

AUTOMATIC DRILLING, TAPPING, ASSEMBLY AND ELECTRICAL INSPECTION OF A SPECIAL NUT



1 Automatically hopper feed Hex Nut Blanks to dial. 2 pieces per stroke.

2 Horizontally drill hole to half depth.

3 HorizoRtally drill hole thru.

4 Electrically inspect for drilled hole.

5 Tap thread thru nut.

6 Shear off Nylon slug and automatically insert in drilled hole.

7 Hydraulically stake Nylon slug to proper depth.

8 Inspect for Nylon slug.

9 Automatically eject finished nuts.

PRODUCTION

Battery of machines tooled for all sizes of nuts to and including ½" dia. Various materials. Production on ⅜ — 24 standard steel nut is 44 pieces (or 396 operations) per minute.

One operator handles a battery of machines.

Bodine machines can jump your competitive position to the top. Make our engineers prove it. Write for Bulletin.

"You can't meet Tomorrow's Competition with Yesterday's Machine Tools"

THE Bodine CORPORATION
BRIDGEPORT 5, CONNECTICUT
AUTOMATIC DIAL TYPE DRILLING, MILLING, TAPPING, AND SCREW INSERTING MACHINES

28050

GREENLEE AUTOMATICS

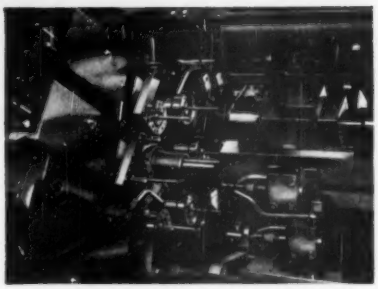
HAMILTON BEACH GETS BOTH ON PRODUCTION OF FOOD MIXER PIECES

The *speed* and *versatility* of Greenlee Automatics give Hamilton Beach profitable long and short-run economy in the production of food mixer pieces.

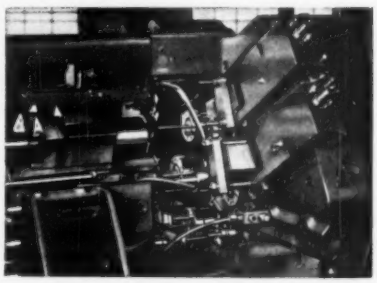
SPEED: The worm-wheel hub illustrated formerly required 17½ seconds to complete, plus a second operation to round off the back corner. *Greenlee Automatics are now entirely completing this part in 4 seconds!*

VERSATILITY: Hamilton Beach knows well this feature! Production of the worm-wheel shaft shown above is typical of the wide variety of operations accomplished on Greenlee Automatics in this up-to-date-plant. The three 1-inch 6-Spindle AIR-FEED Automatics installed there have proved to be a profitable investment.

You, too, can profit with Greenlee Automatics. Send us details of your work . . . or write for additional information NOW!



Photographs show tooling for the worm-wheel shaft. The slots are cut at 90° with two synchronized milling units, and the part is entirely completed in 9 seconds.

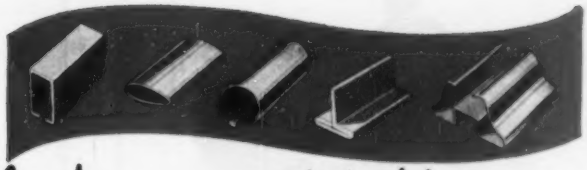


PRODUCTION MACHINERY

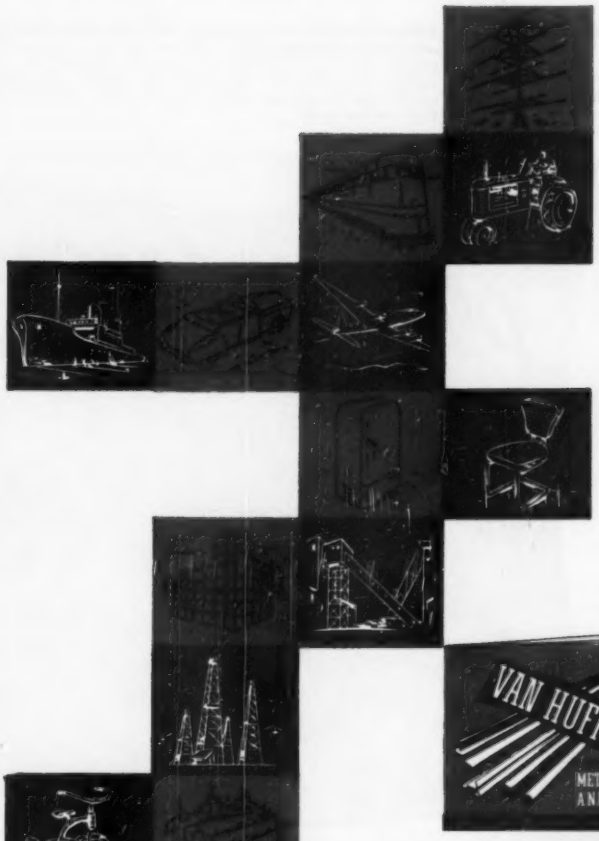
GREENLEE

GREENLEE BROS. & CO., 1729 Mason Ave., Rockford, Ill.

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES



VAN HUFFEL metal shapes and tubing..



are proving their value in these widely diversified industries

Whatever your product .... battleships or baby buggies .... toys or television equipment .... it's just possible that Van Huffel rolled shapes or tubing can simplify production and lower costs.

You will find, too, that Van Huffel's "under one roof" procedure—designing and building forming dies *plus* cold forming shapes and tubing in continuous lengths—is worth your consideration.

Illustrated brochure gives you the whole story. Write for it today.

Van Huffel forms to your specifications: Welded, Lock Seam, Open Seam and Butted Tubing; Shapes and mouldings in any metal in thicknesses up to 5/16".

HOW ABOUT Yours?

VAN HUFFEL
TUBE CORPORATION · WARREN · OHIO

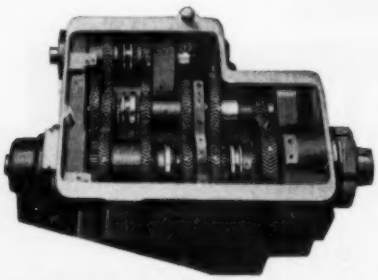
continuous rolled

METAL SHAPES · TUBING

Tumbling Barrels . . to Resist Corrosion and Abrasion. These barrels are subject to extreme wear from small parts being cleaned by the swirling agitation of caustic solution and abrasives. For extra-long life, they are fabricated from wear- and corrosion-resistant Ampco Grade 8 sheet, carbon-arc welded with 5/32" Ampco-Trode 160 coated electrodes used as filler rods.

Ampco Extrusions available as solid rod and/or tube in rounds or simple shapes. From Ampco's own 2275-ton hydraulic press and extrusion mill. Their use saves metal, machining time, and costs. Superior grain structure and exceptionally high strength are assured — *plus* close tolerances and good surface finish.

Ampco Metal Cam . . . for Smooth Action, Extreme Wear-Resistance. Ampco Grade 20 selected because it actually outlasts hardened steel with twice the Brinell hardness. This is due to its extreme wear-resistance and the smoother action of bronze against steel. Also ideal for rollers, gibs, slides, wearplates, forming dies on light-gauge steel and welding jaws.



Ampco Bushings on High-Speed Headstock . . . for High Wear-Resistance. There are 16 Ampco Grade 18 Bushings in this one headstock: 14 on loose-running gears, 2 on the center bearing of the intermediate shaft and main spindle. Ampco Grade 18 chosen as ideal alloy because of the heavy gear loads and high spindle speeds. Extra life assured by high tensile (77-85,000 psi), and Brinell hardness of 159-183.

Stock Bars of Grade 18 Ampco Metal . . . for Production and Maintenance where long life is important. Wear-resistant. Have exceptional impact and fatigue characteristics. Centrifugally cast to provide dense, fine grain structure free from impurities. Readily machinable. Ideal for bearings, bushings, gears, worm wheels, slides, guides and other wear applications. Available from stock in 12½-inch lengths from 2½-inch to 6-inch OD, or solid bars ½" to 4½" diameter, cut to desired lengths.

Paper Mill Rolls . . Wear-Resistant for Longer Service. Weight and wear are the usual problems in such rolls. Both were licked in this case — with Ampco aluminum-bronze. Centrifugally-cast Ampco Metal Grade A-3 provided a light, hollow roller — resistant to both wear and corrosion. Shaft and end-plates were cast of the same alloy and welded to the roller with corrosion-resistant Ampco Trode 10 electrodes.

Cast Ampco Metal Pump Bodies . . . for Corrosion-Resistance. Ampco Grade 12 selected for its high resistance to corrosion and wear (which is a special quality of all Ampco Metals). Grade 12 also has the advantage of quick, easy seating for valve and pump parts. Meets Federal specification QQ-B-671a, Class A, and Navy specification 46-B-18c.

AMPCO

Equipment Life --Lower Costs ith AMPCO Bronze Parts

Specify Ampco aluminum bronze for these unique, money-saving properties:

1. High tensile strength
2. High compressive strength
3. High impact and fatigue values
4. Excellent bearing qualities
5. High "strength to weight" ratio
6. Resistance to wear and corrosion
7. Good retention of values at temperature extremes

It pays to use Ampco aluminum bronzes wherever you can. These long-wearing bronze alloys assure longer life and better service for almost any part — reduce maintenance and replacement frequency, cut downtime losses to a minimum!

First of all, be sure to specify Ampco bronzes for your own products. They're a mark of extra-quality which all buyers recognize. By the same token, look for Ampco bronze parts as a mark of extra-value in the equipment which you buy. And of course, use Ampco bronze replacements in your own plant maintenance to reduce downtime, service and repairs, and to insure low-cost, trouble-free operation.

Make Ampco Bronze Parts a "must" in every plan — product or production. That way you're sure of lower costs. Send for complete information today.

Ampco aluminum bronze and other Ampco copper-base alloys are available in a variety of grades to meet your exact requirements in any form you need: rolled sheet or plate, sand or centrifugal castings, forgings or extrusions, arc- and resistance-welding electrodes, and corrosion-resistant centrifugal pumps and plug valves.

Free . . . Cost-cutting information! Tear out this coupon and mail today.

AMPCO

Ampco Metal, Inc.
Milwaukee 46, Wisconsin
West Coast Plant *Burbank, California*

Tear out this coupon and mail today!

Ampco Metal, Inc., Dept. AM-9, Milwaukee 46, Wis.

Send me your free Bulletin giving full details of cost-saving physical properties of Ampco aluminum-bronze alloys.

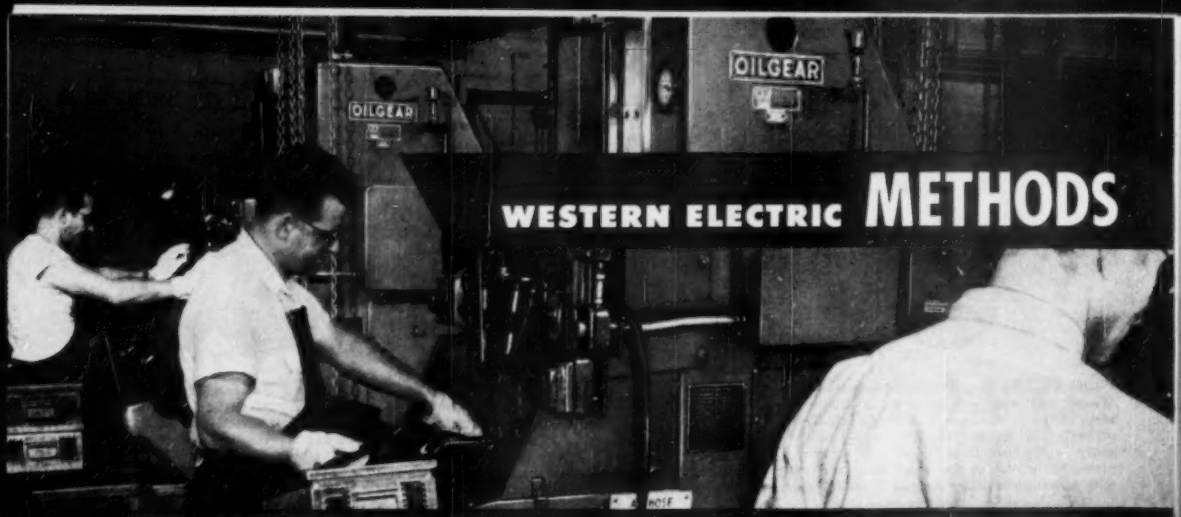
Name ..... Title .....

Company .....

Company Address .....

City ..... ( ) State .....

9-4



WESTERN ELECTRIC METHODS

INCLUDE OILGEAR MACHINES FOR BROACHING STAMPINGS

7 OILGEAR VERTICALS AT CHICAGO

The Western Electric Company, outstanding in the manufacture of all types of telephone equipment, has used Oilgear Broaching Machines since 1928. Some of the Vertical Surface Broaching Machines shown above have been in service more than 10 years. The machines in the upper panel finish broach four edges on stampings for crossbar switches. Production for each machine is in excess of 600 pieces per hour. The Oilgear Verticals in the lower panel finish broach two knife edges on steel stampings used as the armatures of crossbar relays. Here too production from each machine is more than 600 pieces per hour.

Oilgear Broaching Machines offer you many advantages as standard which are exclusive with Oilgear or are to be found elsewhere only at extra cost.

Oilgear Machines are often bought to replace other types of equipment and represent tremendous gains both in initial savings and in greatly increased production. This is true in the case of small factories where every capital investment must be carefully made, and in the case of large industrials where production is largely given over to semi-automatic and fully automatic machines, and unfailing dependability becomes just that much more vital. It will pay you to investigate what Oilgear Broaching Machines can do for you. THE OILGEAR COMPANY, 1563 W. Pierce St., Milwaukee 4, Wisconsin.

OILGEAR

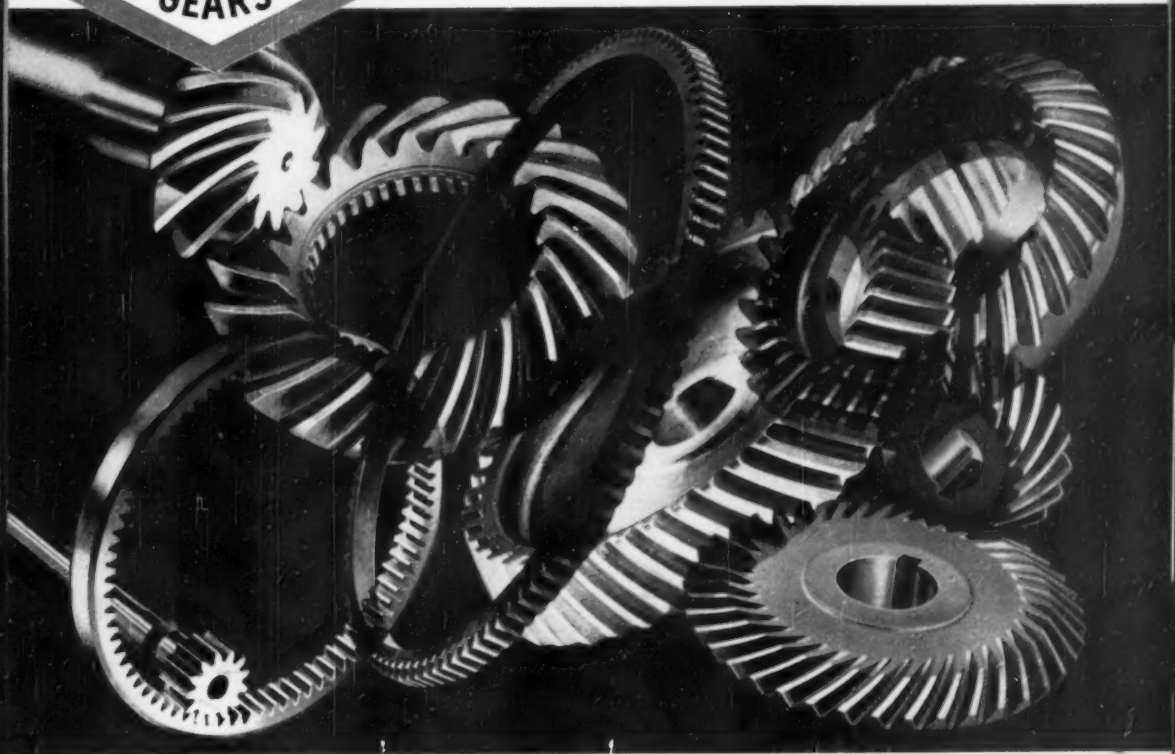
Oilgear

PIONEERS IN FLUID POWER

BROACHING MACHINES AND PRESSES

DOUBLE DIAMOND
TRADE MARK
GEARS

Remember the Name but *forget* the Gears!



INSOFAR as perfection is humanly possible you have a right to demand perfection of the gears you buy. You want to buy them—install them—and forget them. You want gears that relieve you of the headaches of assembly, replacement, and customer dissatisfaction.

No gear manufacturer should make blue-sky promises on this score. The best-made gears will fail under certain circumstances and abuses. But you can surely minimize such troubles by selecting gears notable for their reliable performance.

"Double Diamonds" are gears of that character. They are built to produce *low installed cost—to serve economically and dependably on the job for which you buy them—and to do credit to your product and your reputation.* Scores of America's leading companies specify "Double Diamonds" for these reasons—and have come to regard Automotive Gear Works as their "gear department" both in design and manufacture.

So *remember* the name—"Double Diamonds"—and you may discover, as so many others have, that with "Double Diamonds" on the job you can *forget* the gears themselves.

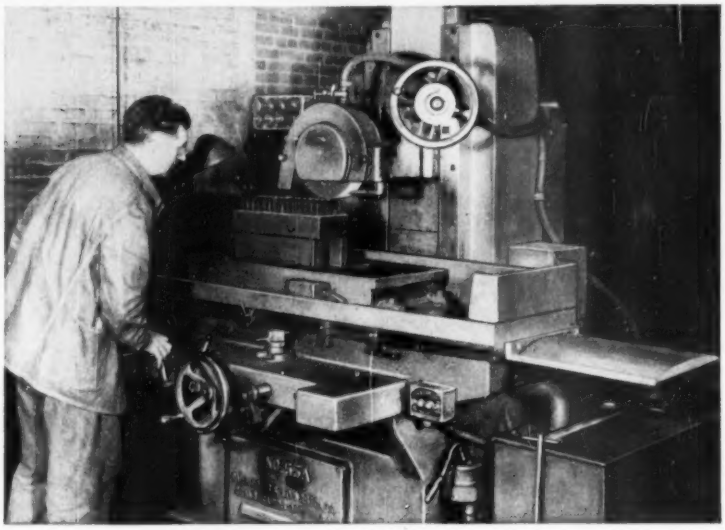
DOUBLE DIAMOND
TRADE MARK
GEARS

Automotive Gear Works, Inc.
RICHMOND, INDIANA

FOR AUTOMOTIVE FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS

*Reg. U. S. Pat. Off.

Enthusiastic Customers do our BEST advertising



True Temper Corporation, manufacturers of True Temper Products, use fourteen Grand Rapids Hydraulic Feed surface Grinders in ten of their factories. The machine shown is a 55A.

You will appreciate the micro-inch finish produced at production speeds on Grand Rapids Grinders. All Grand Rapids Hydraulic Feed Surface Grinders have these outstanding features:

1. **One-piece column and base casting for vibrationless rigidity**
2. **Precision ball-bearing spindle which is greased for life**
3. **Bijur one-shot lubrication system eliminating hand oiling**
4. **Patented vertical movement of wheel head for quick, accurate adjustments**
5. **Portable coolant tank for ease of coolant replacement**
6. **Vane type hydraulic pump for fast longitudinal table travel**

to serve you—

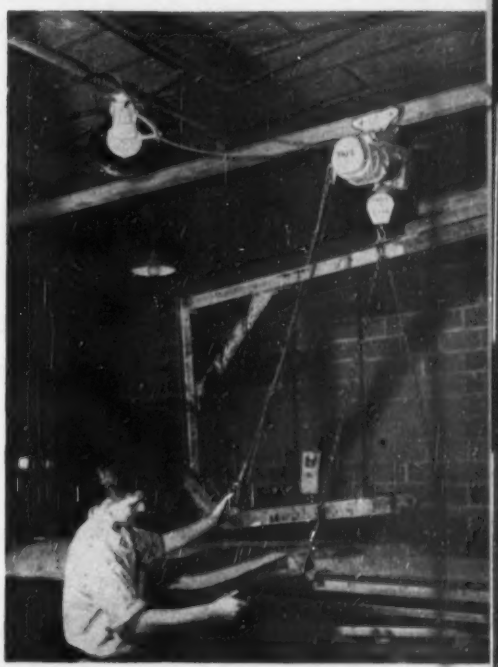
Your inquiry concerning your specific grinding needs will receive prompt attention. Grand Rapids Grinders include: Hydraulic Feed Surface Grinders, Universal Cutter and Tool Grinders, Hand Feed Surface Grinders, Drill Grinders, Tap Grinders, and Combination Tap and Drill Grinders.

GALLMEYER & LIVINGSTON
COMPANY

330 Straight, S. W., Grand Rapids 4, Mich.

GRAND RAPIDS GRINDERS

Cut Costs WHERE YOU CAN CUT THE MOST



MATERIAL HANDLING COSTS absorb as much as ⅓ of every manufacturing dollar. To trim those costs requires systemized handling procedures plus the right equipment.

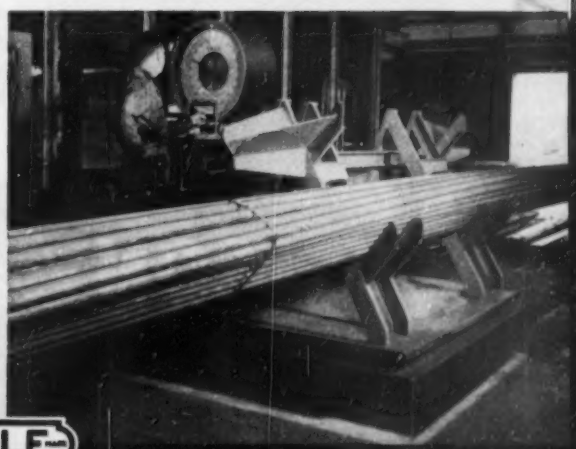
Efficient Yale Material Handling Machinery has brought new operating economy to thousands of metal producing and fabricating plants throughout the country. It can do the same for you.

Big-capacity Yale Hand Lift and Power Trucks wipe out delays—quickly get material where it is needed. Hoisting operations are stepped up wherever Yale Hoists are used. And the precision accuracy of Yale Scales saves money—prevents errors before they can occur.

Cut costs where you can cut them the most—in lifting, moving, weighing and warehousing. The nearby Yale representative will gladly demonstrate how you can analyze your handling operations and select the best material handling machinery for the job. See your telephone book or get in touch with headquarters.

YALE
TOOLS THAT KEEP INDUSTRY "ON THE MOVE"

THE YALE & TOWNE MANUFACTURING CO.
Department L-114
Roosevelt Boulevard Philadelphia 15, Pa.



YALE

MATERIAL HANDLING MACHINERY · *hoists . . hand and electric · trucks . . hand lift and power · industrial dial scales*

AXELSON FIRST CHOICE *in Lathes because*

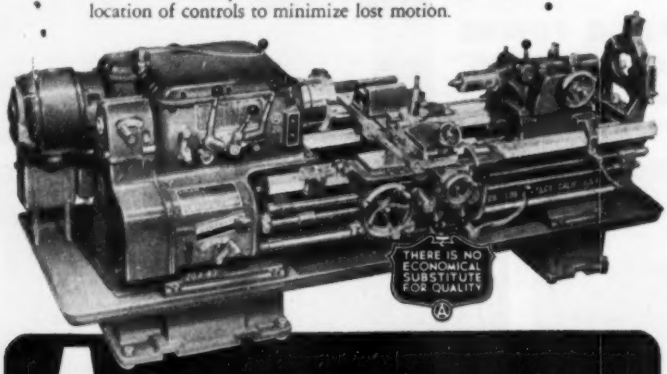
THE "FEEL" OF PROTECTION...
is immediately apparent the first time a machinist puts the tool to the work. Velvet-smooth control action – continuous flow of power at the cutting tool without vibration or chatter.

PRACTICAL VERSATILITY...
permits a wide variety of operations with all types of tools on any kind of stock.

THE TOOL CARRIES THROUGH...
with precision accuracy from the beginning to the end of each cut. Massive construction throughout maintains absolute alignment.

LONGER LIFE, LESS MAINTENANCE...
reduces to a minimum production shut-downs for maintenance or repair – provides years of added precision work at no replacement cost.

MORE PRODUCTION PER CAPITAL DOLLAR INVESTED...
is assured because of faster speeds – greater ease of operation – ample reserve of smooth power at the cutting tool to handle any work without slow-down – scientific location of controls to minimize lost motion.



AXELSON *Lathes*

DEPENDABLE FOR A THIRD OF A CENTURY

AXELSON MANUFACTURING CO. – Los Angeles 11 • New York City 7 • St. Louis 16

Authorized Distributors in All Principal Industrial Centers

Ask your **VICTOR** *distributor about*

THE NEW molyflex HIGH SPEED HAND HACK SAW BLADES

Your Victor distributor will tell you that this new "Molyflex"... when pitted against eight leading competitive blades in cutting treated SAE 52100 ball bearing steel . . . *averaged 23.8% more metal cut* than all the leading brands tested. He will tell you that this new "Molyflex" . . . an addition to the Victor line . . . has greater uniformity, is absolutely shatterproof and unbreakable when used in a frame.

VICTOR STEELRITE METAL MARKING CRAYONS

Ask your Victor distributor about the new Victor Steelrite Metal Marking Crayons. Available in a variety of sizes, these crayons are made of genuine soapstone. Special extrusion process insures uniform strength and composition. Markings can be made on hot, cold, damp or grimy metal and withstand pickling, yet do not affect enamel application.

Don't forget to ask for a free copy of the Victor Metal Cutting Booklet for your pocket or tool kit and the Victor Wall Chart for your shop. They'll help you get the maximum efficiency from your metal cutting saw blades.

VICTOR

SAW WORKS, INC., Middletown, N. Y., U. S. A.

Makers of Hand and Power Hack Saw Blades Frames and Band Saw Blades

Get a Head Start on YOUR I.D. PRODUCTION NOW!

To meet your ever-increasing need for product-improving accuracy and finish on internal diameters, Sunnen has stepped up production schedules to assure still faster delivery of honing machines and supplies.

Ordnance contracts, in particular, may require closer tolerances and smoother finishes. And Sunnen Honing Machines handle everything from de-burring to micro-fitting.

Better Product Performance—Longer Product Life

Sunnen Honing produces geometrically true holes—free from bell-mouth, taper and warpage. Accuracy within .0001" guaranteed. Surface finish to 2 micro-inches R.M.S.

As a result, Sunnen-Honed bushings, bearings and cylinders give smoother and longer operation with lower maintenance costs.

Solves Tough Production Problems

Versatile Sunnen Precision Honing Machines are solving difficult production problems for many of America's leading manufacturers. They also save time and money on salvage, maintenance, experimental and tool room work.

Stationary equipment hones diameters from .120" to 5.5"; *portable* equipment from .185" to 14.5". Hones open and blind holes—holes with keyways, ports and lands—metals of any hardness except lead—as well as carboloys, ceramics, glass and plastics.

Prompt delivery from stock of all models of honing machines and honing tools and supplies. Trained honing engineers are at your service, without obligation. *You can be in production in two weeks' time.* Mail the coupon for details.

SUNNEN PRODUCTS COMPANY
7925 Manchester Ave., St. Louis 17, Mo.
Canadian Factory: Chatham, Ontario

USE EXTERNAL HONING TO MATCH THE ACCURACY OF THE BORE

For perfect fitting of precision parts—without selective assembly—use Sunnen internal honing for the bore, and Sunnen external honing for the mating part. External honing range .120" to 2.750", for pins, plungers, shafts, arbors, spindles, pistons, etc. Write for bulletin.

"Rounds Up Bore For Free-Sliding Fit."

Anthony Giannini
Supervisor
Yale & Towne Mfg. Co.

Slow-speed gear
Material — Drop forging
Hardness — Rockwell 50-60 "C"
Hole diameter — 1.291"
Length — 2¼"
Tolerance — .001"
Finish — Smooth
Stock Removal — .0002" to .0015"
Production — 45 per hour

"Improves Performance—Extends Service Life."

Albert Molnar
Plant Superintendent
Jacquard Knitting Machine Co.

Clutch roller housing
Material — 1020 steel
Hardness — Rockwell 60 "C"
Hole Diameter — 1.248"
Length — 1.250"
Tolerance — .00025"
Finish — smooth
Stock removal — .002"
Production — 50 per hour

"Speeds Assembly—Improves Operation."

Hillman J. Allen
General Foreman
I. T. E. Circuit Breaker Co.

Circuit breaker latch — 3 holes, 2 in alignment
Material — Laminated steel
Hardness — Rockwell 60 "C"
Hole diameter — .500" and .4375"
Length — 2¾" and ⅜"
Tolerance — .0005"
Finish — 10-12 micro-inches
Stock removal — .001" to .0015"
Production — 90 holes per hour

SUNNEN PRODUCTS COMPANY
7925 Manchester Ave., St. Louis 17, Mo.

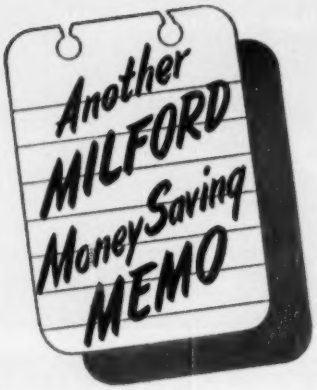
☐ Please send me information on Sunnen Honing.
☐ See enclosed data. Send recommendations.
☐ Please have representative call.

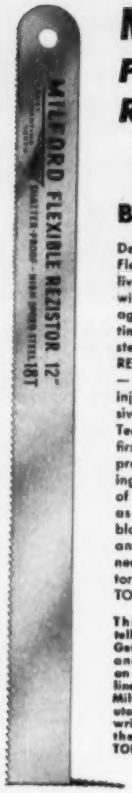
Name.....

Company.....

Address.....

City..... State.....





MILFORD
FLEXIBLE
REZISTOR
MEANS
LONGER
BLADE LIFE

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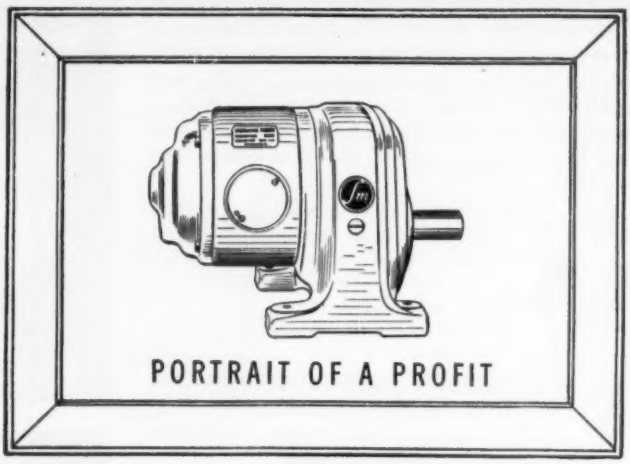

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QUICK FACTS

NEW EYEWIRE — A major contribution to *looks with strength.* Outer edges are square instead of round with a deep groove to hold lenses securely in place. Beaded engraving adds a distinctive touch. The lightweight eyewire is strong and durable.

NEW RUGGED ENDPIECE—Streamlined . . . with a wide bearing surface at hinge which minimizes temple drop. Screw heads are countersunk and flush with endpieces for added good looks, non-sagging security.

NEW LIGHTWEIGHT TEMPLE—Oval temples instead of round for greater comfort and attractiveness. Easily adjusted, perspiration proof. Insulated semi or half tubing is another appearance improver and will outlast life of the temple. Tubing will not come off and it can't be discolored by dirt or grease. Both the temple and endpiece screws are AO patented "Ever-tite" construction . . . they keep tight in service yet remove quickly when replacing lenses.

IMPROVED GUARD ARMS AND BRIDGE — Guard Arms are newly shaped — longer with more opening for added ease of adjustment. The bridge is double braced with four contact joints — a feature found only in AO Ful-Vue spectacle goggles.

NEW SIDE SHIELD CONSTRUCTION — A real time saver . . . new one-piece binder and eyewire construction *eliminates necessity of inserting the screen before inserting lenses!* Replacement of lenses can now be made without any interference with or from the side shield.

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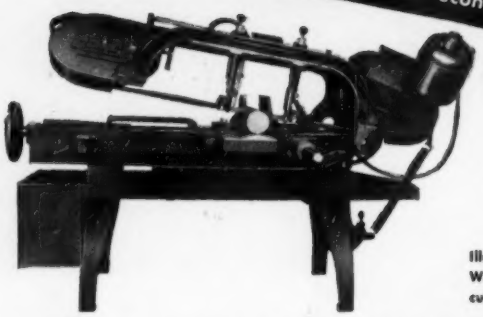

Illustrated is the popular Wells No. 8 with wet cutting system.

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HORIZONTAL band sawing is the modern, cost-cutting way to handle cut-off jobs . . . and Wells Saws are the leaders among horizontal metal cutting band saw machines. Simplicity of design means fewer moving parts and easy operation. Ruggedly built to increase productivity and reduce cutting costs, a Wells Saw pays for itself quickly and will give you years and years of dependable, satisfactory service.

BIG JOBS or LITTLE Jobs . . . There's a "WELLSAW" to meet your Metal Cutting Requirements. Check the table below and write for complete descriptive information or a job demonstration.

MODEL	49 A	No. 5	No. 8	No. 12
Capacity in inches: Rounds	3½	5	8	12¾
Rectangular	3½ x 6	5 x 10	8 x 16	12 x 16
Blade speeds, ft. per min.	54, 100, 190	60, 90, 130	60, 90, 130	50, 100, 150
Motor Size	1/6 H.P.	⅓ H.P.	½ H.P.	¾ H.P.
Floor Space, in inches	16½ x 38	21 x 50	24 x 72	32 x 78
Wet cutting system	No	Yes	Yes	Yes

Automatic stock projection available for Nos. 8 and 12.

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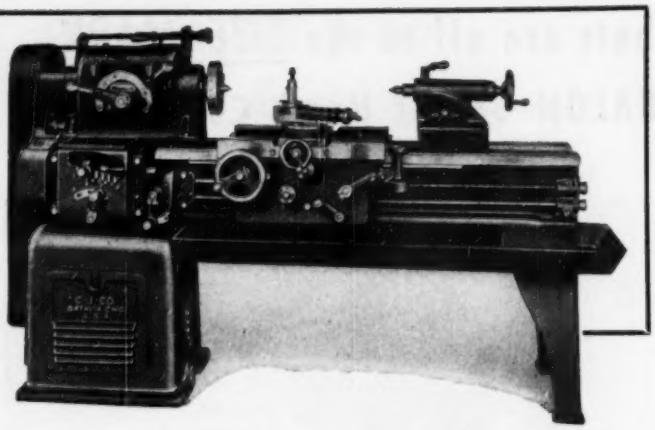

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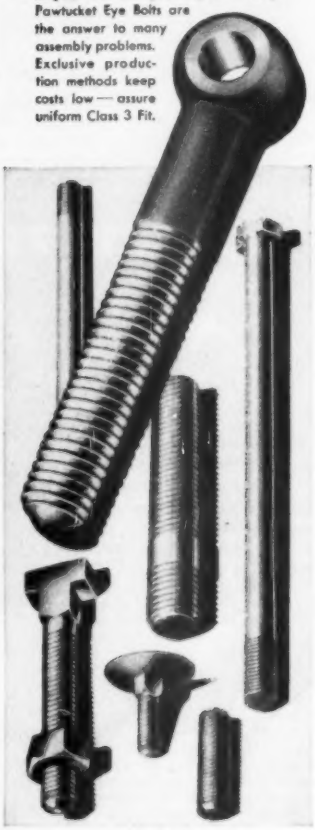

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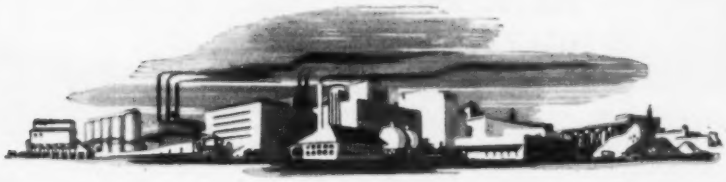

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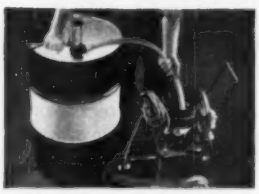

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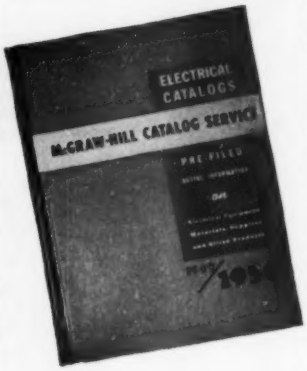

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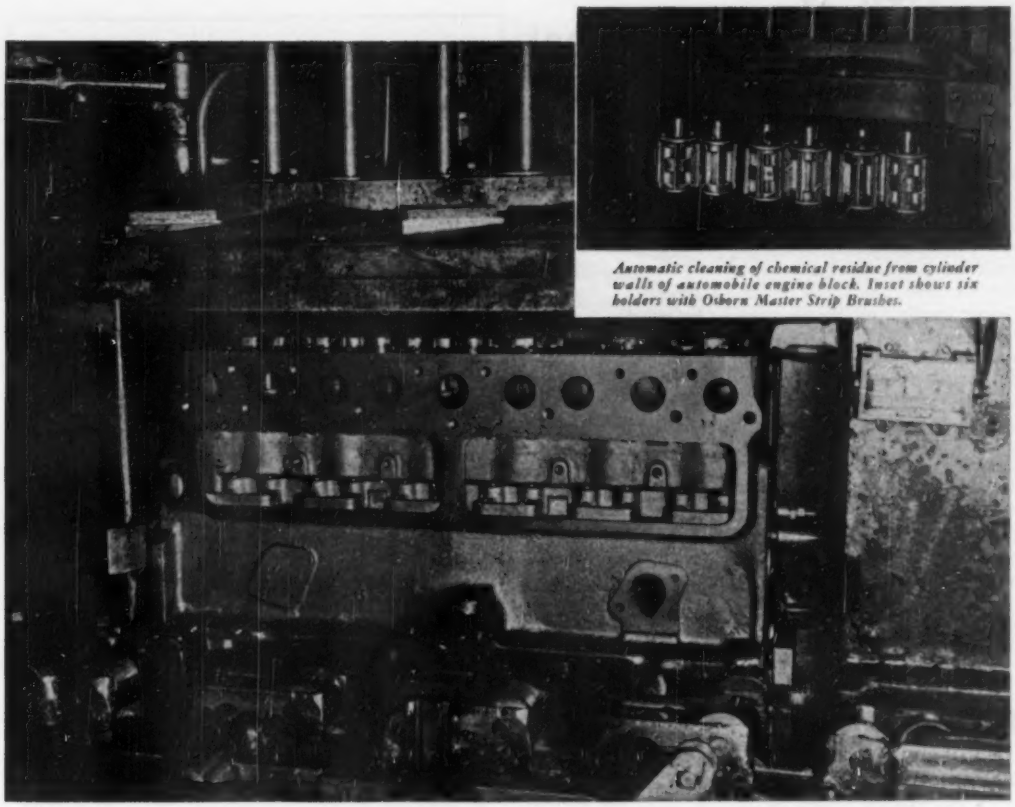

Automatic cleaning of chemical residue from cylinder walls of automobile engine block. Inset shows six holders with Osborn Master Strip Brushes.

Inside Story: How Osborn brushing adds miles to motorblocks

WITHIN the walls of each engine block are many secrets of modern motor car performance. Of these, surface finish plays a major role for extending operating efficiency . . . for prolonging engine life.

When it comes to cutting wear and corrosion, complete freedom from metallic burrs and residue is all important. To achieve this result at low cost, a leading car manufacturer is automatically brushing away burrs, chemical residue and other foreign matter from cylinder walls after a special metal treatment to increase wear resisting qualities.

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Whether your problem of cleaning, finishing or polishing of parts involves simple shapes or more complicated designs, it is likely that an **OBA** (**O**sborn **B**rushing **A**nalysis) can demonstrate how your work can be done better, faster and at low cost by Osborn Power Brushing. The services of the **O**sborn **B**rushing **A**nalyst, backed by Osborn's extensive technical facilities, are yours for the asking. Let us demonstrate how you too can profit by new Osborn techniques. Write today for an **OBA**. *The Osborn Manufacturing Company, Dept. 333, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

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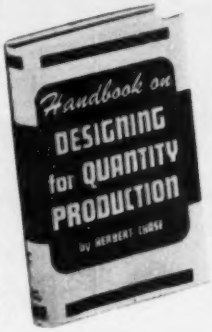
How to design more economical basic parts for quantity production — quicker



HERE is an outstanding handbook that provides you with tested rules to follow in designing parts for quick, economical mass production — and enables you to avoid the necessity for redesign. You'll find it packed with invaluable design pointers on materials, exact design considerations, actual advantages and drawbacks, various high-production processes and straightforward rules to follow in designing basic parts for quantity production by stamping, sand casting, die casting, screw machine, die forging, heading or plastic molding processes. Complete explanations of high-production processes are given along with sound pointers on what to do and what to avoid in designing for each.

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By HERBERT CHASE

564 pages, 417 illustrations, numerous tables and charts, $7.50

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Features of 2nd edition:

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- **includes new sections that compare sintered powder compacts with high production parts—malleable iron castings with wrought parts**
- **highlights design methods that result in lowest production costs**

It covers the design of die-forged parts, die castings, permanent - mold castings, screw - machine products, stampings, plastic moldings, and many other metal products. In Part II various types of products manufactured in quantities at moderate or minimum cost are compared, one against the other, with many actual production costs and tabular comparisons which show the type of design best adapted for economical manufacture in specific instances.

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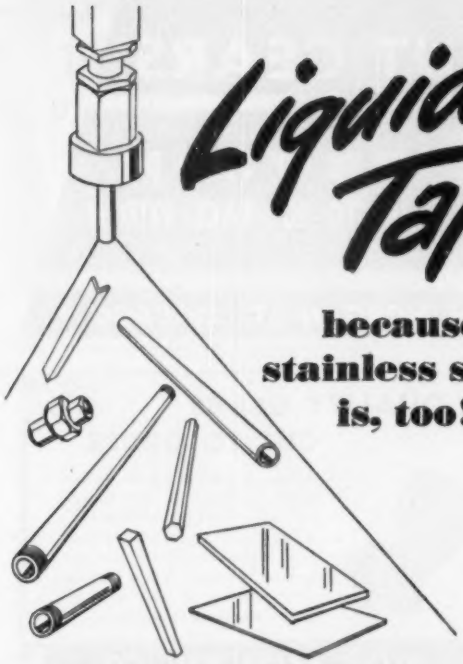
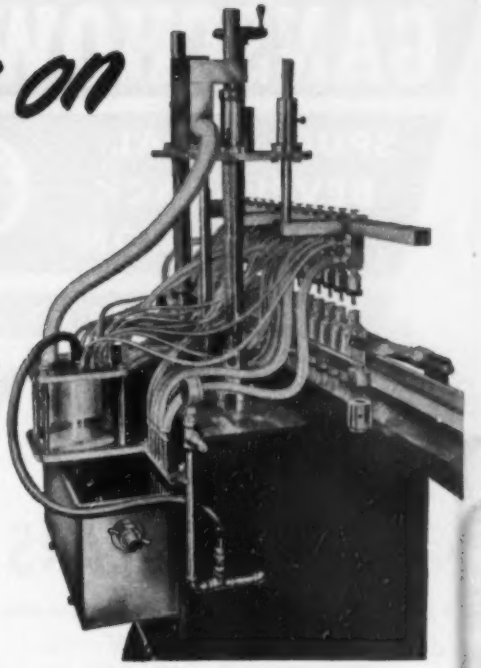
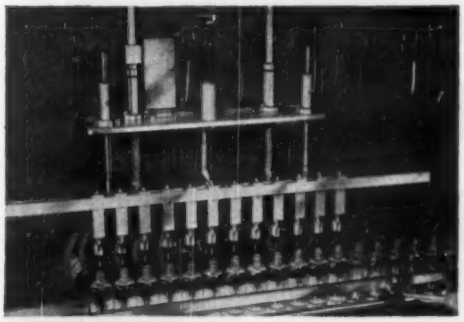


Liquids on Tap

because stainless steel is, too!





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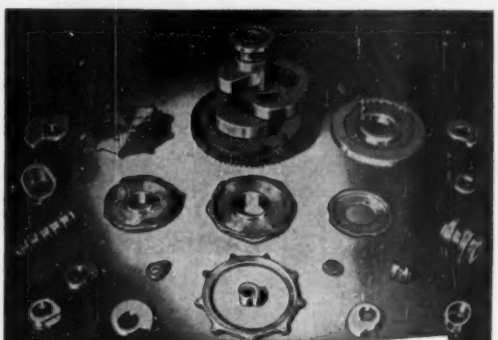

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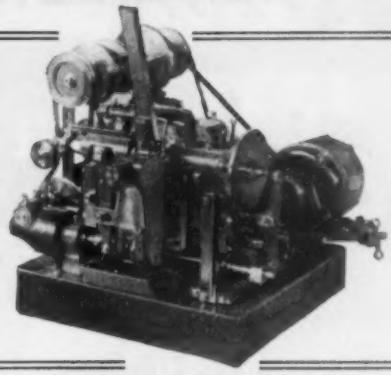

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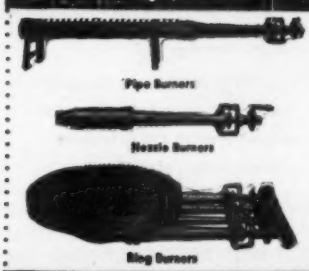

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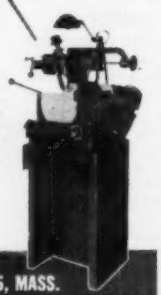

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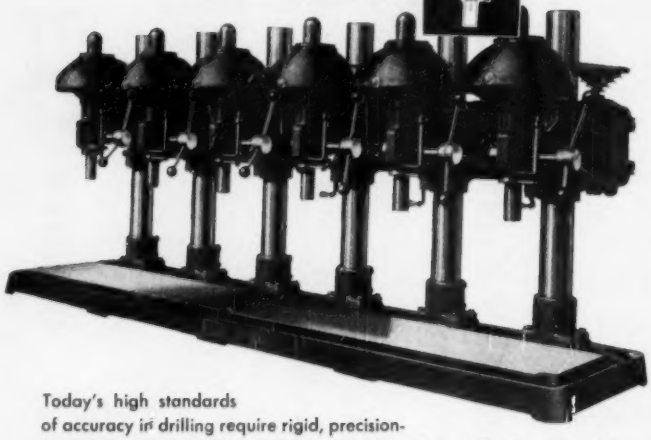

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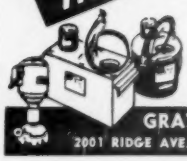

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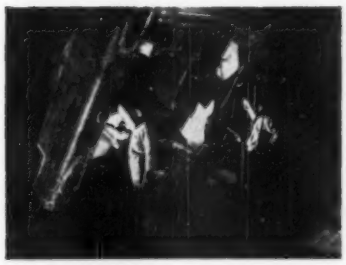
Have superior physical qualities — ideal for welding heavy sections that must withstand severe shock and abuse.



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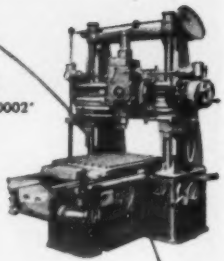

No. 2H
Working range . . . . . 16" × 10"
Table top to spindle end. . . . 19"
From spindle axis to column 13 ¾"
Boring capacity . . . . . 1" dia"
Guaranteed accuracy: .0001"

SIP

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Working range. . . . 60" × 40"
Table top to spindle end . 37 ⅜"
Free space between uprights 63"
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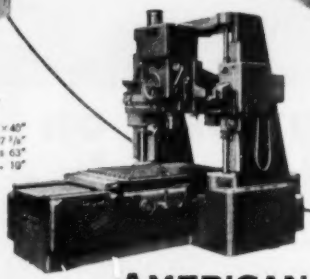

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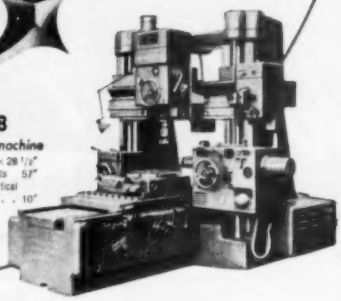

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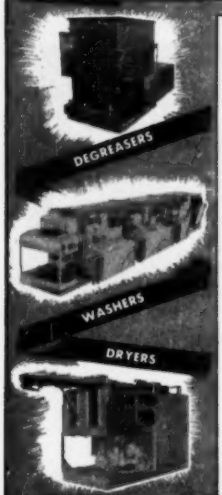

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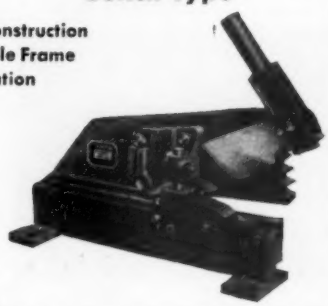

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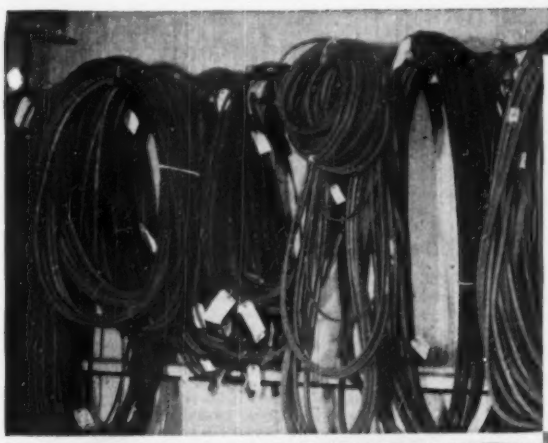

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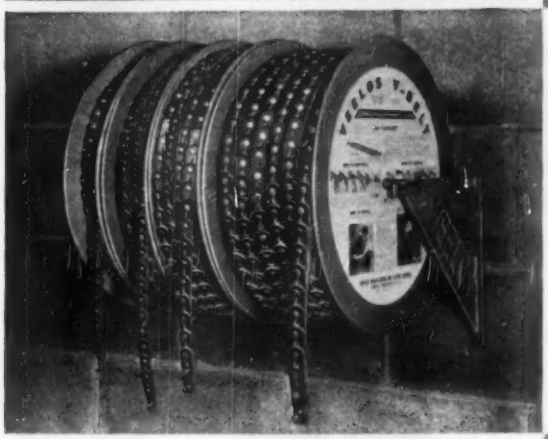

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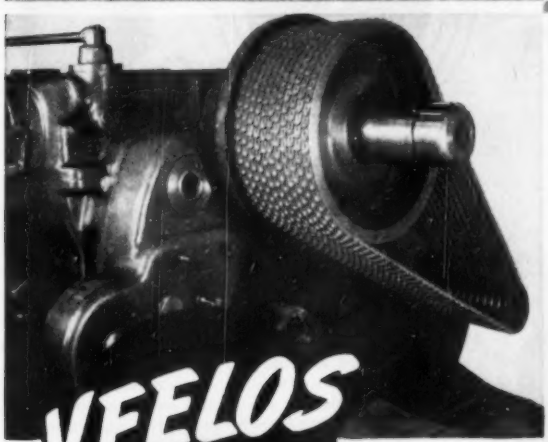

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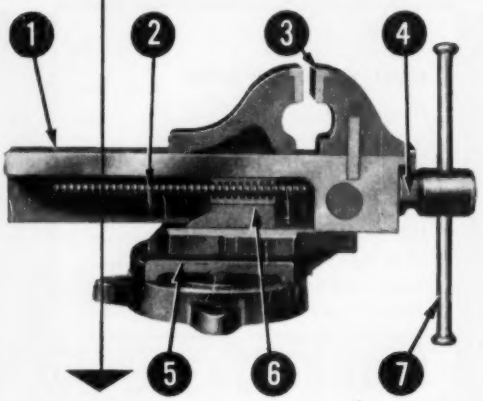

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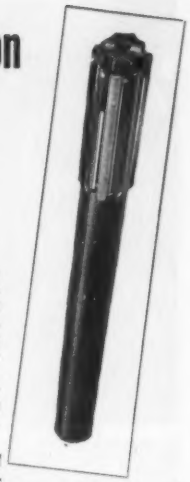

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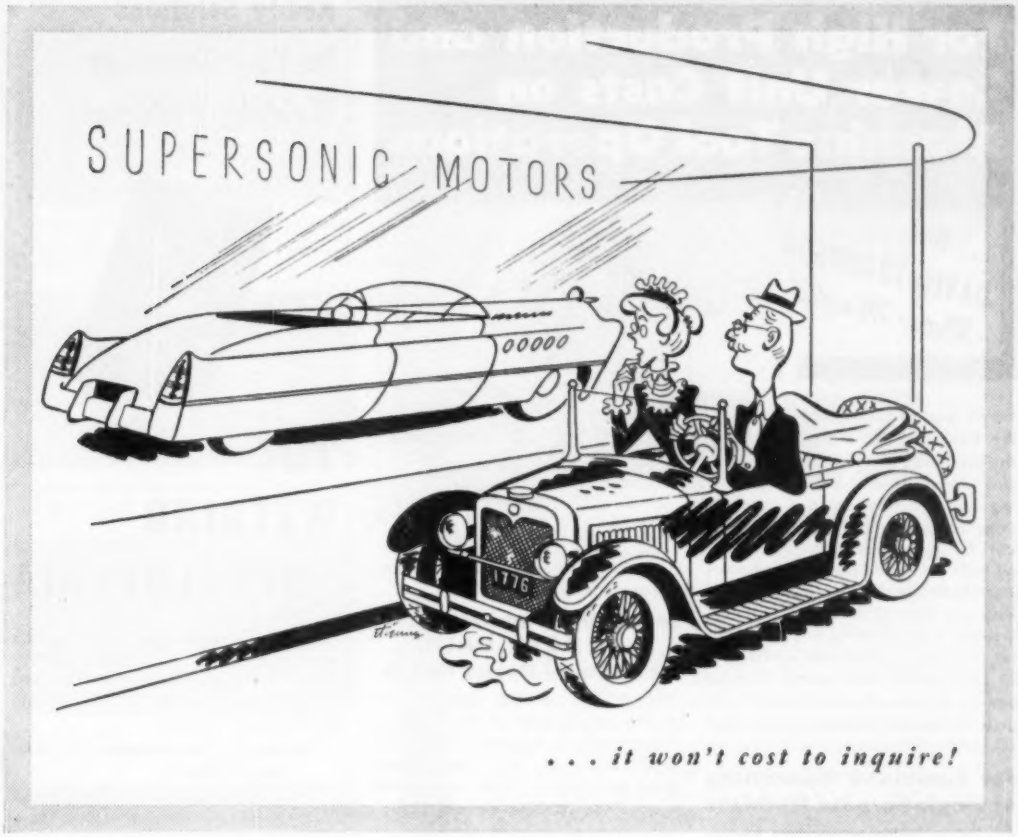
RUTHMAN GUSHER
MACHINE TOOL COOLANT PUMPS

Everything about Ruthman Gusher Coolant Pumps is designed to give you long trouble-free life. There are fewer parts to wear, no metal-to-metal contact within the pump. Heavy-duty, pre-lubricated ball-bearings require no further lubrication or attention. Dynamically balanced rotating parts cut vibration to an absolute minimum. Your coolant system will last longer, work better when you specify Ruthman Gusher Coolant Pumps. Write for Catalog today.

THE RUTHMAN MACHINERY CO.



. . . it won't cost to inquire!

YOU MIGHT INCREASE CARBIDE DIE LIFE TWO TO SIX TIMES. The life of a carbide die depends on two factors, surface finish and geometry. The majority of carbide dies today are finished by a slow process of hand lapping. This produces a surface finish which apparently will stand a lot of abuse. But the geometry of the hole is a random proposition in the light of recent developments.

Bryant Internal Grinders are built to grind holes which have fine geometry—a geometry which is uniform in all pieces. The life of dies ground on Bryant grinders has been extended two to six times over dies finished by the old method. This is due to the accuracy of the angles, the roundness of the holes, and the fine finish.

A Bryant machine will pay for itself in a short time by extending the life of the die and by substantially reducing the cost of refinishing worn dies.

Bryant Chucking Grinder Company is prepared to give you accurate figures on production and costs so that your management can translate them into terms of investment. Send your present production figures to Bryant now. We will give you data which may help you buy that much needed machine.

Remember—it won't cost to inquire.

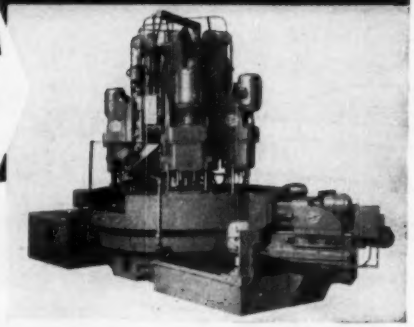
BRYANT

CHUCKING GRINDER CO.

SPRINGFIELD, VERMONT, U.S.A.

For High Production and Lower Unit Costs on Machine Tool Operations

...USE DAVIS & THOMPSON *Roto-Matics*



Here's a good example of the application of standard machine units to a special production job. Drilling and reaming operations of suspension support holes are performed on both right-hand and left-hand parts simultaneously. Drilling and reaming king pin holes is also included. Six stations, five operating and one loading, handle all operations with a total of 16 spindles. Machines of this type can be furnished from standard basic units for special applications on most all metalworking operations.

For Combined Operations or Single Purpose Machines

Machines similar to this can be designed to handle dissimilar operations in the same parts or one operation on continuous production. An indexing table with ROTO-MATIC POWER HEADS is easily arranged to suit special machining operations.

Lower Maintenance Costs with ROTO-MATIC Mechanical Power Heads

This machine is a good representative of the applications of D. & T. Roto-matic mechanical power heads. Six heads are used, three vertical and three horizontal. These new power heads lower maintenance costs through elimination of excessive servicing.

FREE DATA

will be furnished upon request. Write today. Ask for Bulletin AM.

DAVIS and THOMPSON *Roto-Matic*

Davis & Thompson Company

6411 W. BURNHAM ST., MILWAUKEE 14, WISCONSIN

From The *American Machinist* Library of *Tips for Top Shop Men*

STUDY the trends and statistics, and be guided by them—but never forget that your customers, your suppliers and your workers are not statistics, but people.

NO two workers are alike, either in method of working or in temperament. Remember this when you teach methods or attempt discipline.

Ready Solutions To Your Everyday Welding Problems

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The enlarged, authoritative twelfth edition of THE WELDING ENCYCLOPEDIA marshals every fact and every rule—every bit of the reliable guidance you need in:

—*handling any welding jobs, simple or complex.*

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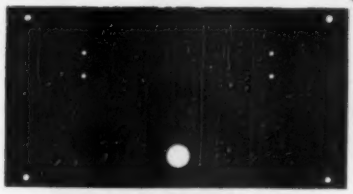
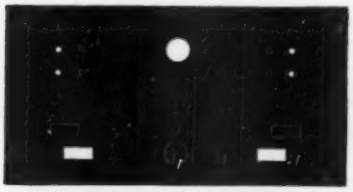
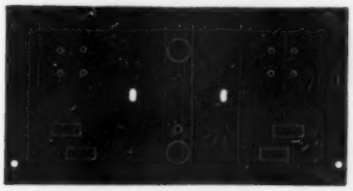


Setting up 3 Work Stops and 9 Wales Hole Punching Units for above operation required only 9.6 minutes. See combined set-up and running time for 50 pieces below.

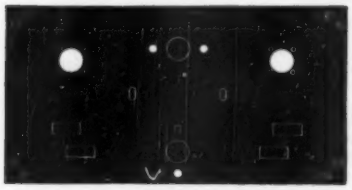
Setting up 2 Pick-up Stops and 5 Wales Hole Punching Units for above operation required only 6 minutes.



Setting up 2 Pick-up Stops and 7 Wales Hole Punching Units for above operation required only 7.6 minutes.



Setting up 2 Pick-up Stops and 4 Wales Hole Punching Units for above operation required only 5.2 minutes.



Setting up 2 Pick-up Stops and 5 Wales Hole Punching Units for above operation required only 6 minutes.

PERFORATING TIME AVERAGES APPROXIMATELY .2 MINUTES PER OPERATION, THE TOTAL RUNNING TIME FOR 50 PIECES IS (.2 x 50 x 5 OPERATIONS) 50 MINUTES.

THE COMBINED SETUP AND RUNNING TIME OF THE 50 PIECES IS 34.4 PLUS 50 OR A TOTAL OF 84.4 MINUTES.

Compare

WALES

TIME STUDIES

WITH YOUR PRESENT METHODS

● If your present methods of hole punching do not produce similar parts including set-up time as fast as the total time of the typical part shown at the left you are letting dollars fly out your window.

The patented design features of Wales Type "BL" Hole Punching Units provide *cost savings* that you cannot afford to overlook. For example, only 16 Wales Type "BL" Hole Punching Units were required to punch the 30 holes in the work shown at left.

Write for fully-illustrated Bulletin 7 TODAY and have all the cost-saving facts at your finger tips.

WALES-STRIPPIT CORPORATION

GEORGE F. WALES, *Chairman*

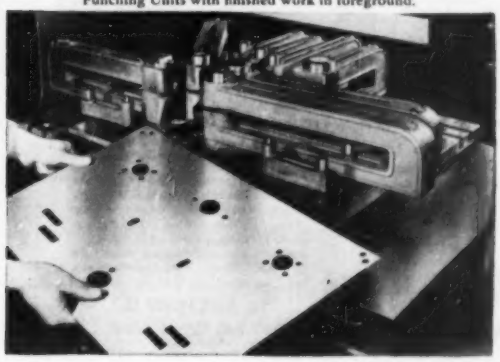
373 PAYNE AVENUE, NORTH TONAWANDA, N. Y.

(Between Buffalo and Niagara Falls)

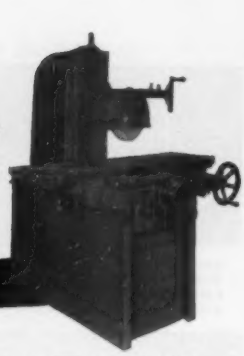
WALES-STRIPPIT OF CANADA, LTD., HAMILTON, ONTARIO

Specialists in Punching and Notching Equipment

Showing a typical set-up of a series of operations of Wales Hole Punching Units with finished work in foreground.



YES... GRINDING HAS COME A LONG WAY SINCE YOU WERE A BOY!



THE NEW 1218 HYDRABRASIVE Surface Grinder

Are you using "boy-at-the-grindstone" methods in your toolroom? If so, why not replace your "old time" surface grinders with the modern 1218 Hydrabrasive — give your toolmakers the machine to make better tools more economically! For production grinding, too, its power, speed, and accuracy cannot be beaten. Hydraulic operation of the No. 1218 is **faster** . . . provides table speeds from 1/2 foot per minute to 90 feet per minute, with 3/8" of cross feed movement in 1/5 of a second! Run-over beyond the work is practically eliminated—the table speed reduces from 90 feet per minute to zero in only 1" of run-over. The No. 1218 is **super-powered.** A 3 HP fan-cooled fully enclosed spindle motor drives the 12" wheel with extra cutting capacity for all work from crush grinding to conventional grinding. You get **wide cross travel** (12") with moderate table length (18") — a deep, massive base, saddle ball ways of hardened steel for precision transverse adjustment, plus many exclusive features that reduce upkeep and cut grinding costs. No matter how you look at it, the No. 1218 is a good buy! For complete information address **Abrasive Machine Tool Co., 8 Dunellen Road, East Providence 14, Rhode Island.** Distributors Throughout the World.

Abrasive Quality is Reflected in the Finish of Your Product

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ACCURACY BOOSTS PRODUCTION

Get HIGH PRODUCTION ACCURACY on internal cylinder finishing with FULMER HONING

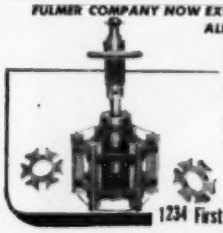
WITH Fulmer Honing Machines, stock can be removed from internal cylinders, ½" to 30" diam., much faster, easier, cheaper, than by any other method, and maintain high accuracy. Stock removal ranges over 90 cu. in. per hour. Hold to ± .0001" tolerances on bore size, straightness, roundness, with any desired surface finish.

(Above) Fulmer Model 10-25, honing 5 ½" bore aircraft cylinder, removing .006" of stock. Rate 24 cyl. per hour.

CHECK THESE TYPICAL PRODUCTION EXAMPLES OF FAST STOCK REMOVAL BY FULMER HONING MACHINES:

PIECE	LENGTH	DIAMETER	STOCK REMOVED	TIME
Hardened Pump Liner	27"	7.250" +.0005"	.015"—.018"	10 min.
Forged Gear Blank	Two 6" Bores	4.250" +.0002"	.005"	1 min.
Chrome Plated Diesel Liner	32"	8.500" ± .0005"	.004"—.006" of chrome	3 min.

FULMER COMPANY NOW EXCLUSIVE U. S. DISTRIBUTOR FOR ALEXANDER BALL HONING TOOLS
Available in sizes from ½" to 30" diam.



FULMER Honing Machines offer the greatest value in the honing field. Write now for new, fully illustrated bulletin giving valuable data on honing applications, Alexander Ball tools, and specifications and construction details on all models of Fulmer Honing Machines. Send for your copy today.

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1234 First National Bank Bldg., Cincinnati 2, Ohio

. . . with many uses, but only one standard of precision

• For research, supervision or control—in laboratory, toolroom or production line—tests made by the "ROCKWELL" Superficial are as representative of hardness as those made on the regular "ROCKWELL" Hardness Tester. Only requirement is that, since depth of indentation is only .005" or less, surfaces must be smooth and materials homogeneous for general testing.

This instrument is especially suitable for testing very thin materia., nitrided or lightly carburized steel and areas too small for regular "ROCKWELL" Hardness Tests. A Wilson Field Service Engineer will be glad to discuss with you whether or not a "ROCKWELL" Superficial Hardness Tester will best serve your needs.

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AN ASSOCIATE COMPANY OF AMERICAN CHAIN & CABLE COMPANY, INC.
ACCO

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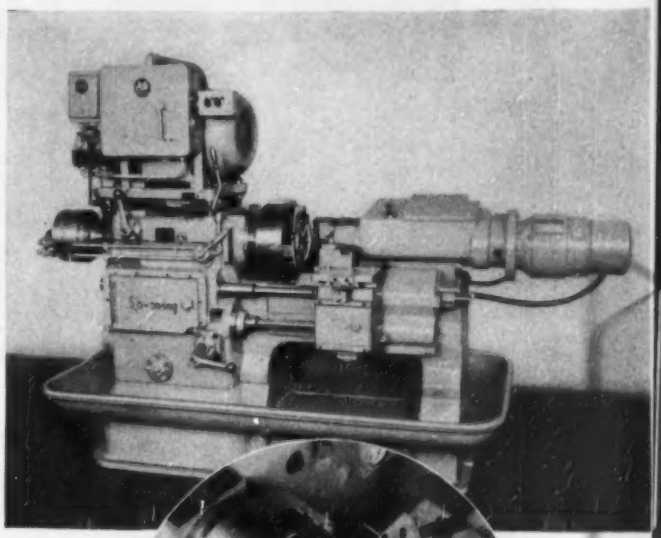
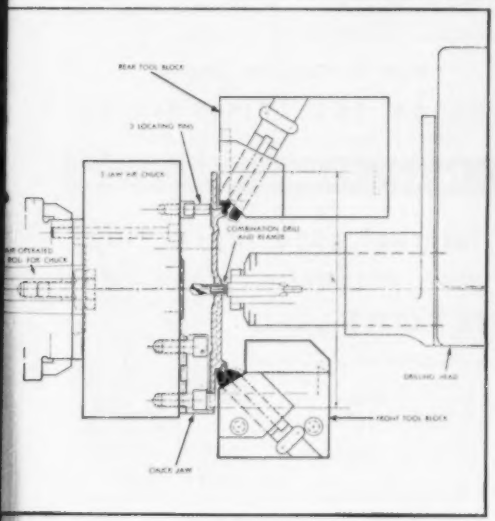
MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

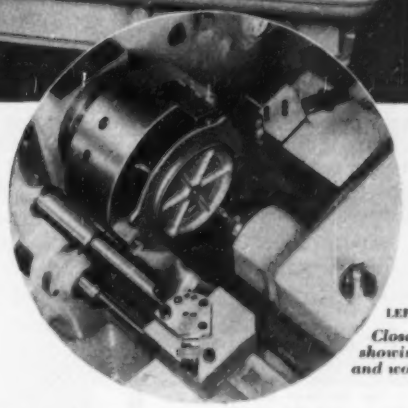
ODEL "LR" Lo-swing RILLS AND REAMS SIMUL-ANEOUSLY WITH TURNING ND FACING OPERATION



RIGHT
Model "LR" Lo-swing Automatic Lathe equipped with Special Motorized Drilling Head



LEFT
Tooling layout for machining and drilling Direct Drive Clutch



LEFT
Close-up view showing tooling and work

roblem: To turn, face and groove the large diameter f a direct drive clutch, and to drill and ream center ole in a single operation.

olution: The Model "LR" Lo-swing Automatic Lathe lected for this job was equipped with a special rilling and Reaming Attachment which replaced the ndard tailstock. This attachment is an electrically-riven, self-contained unit with its own feed cam which ermits fine feed for drilling and coarse feed for ream-g. Two tools on the front carriage turn two diam-ters. Two facing and one grooving tool are mounted on the back attachment. While all tools, including the drill, operate simultaneously, the motorized drilling head provides the correct speed for drill and reamer, while the main headstock drive provides correct speeds for machining the large diameters.

The work, which is cast iron, is held in a 3-jaw, air-operated chuck. Machining tools are cemented carbide while the combination drill and reamer is of high-speed steel.

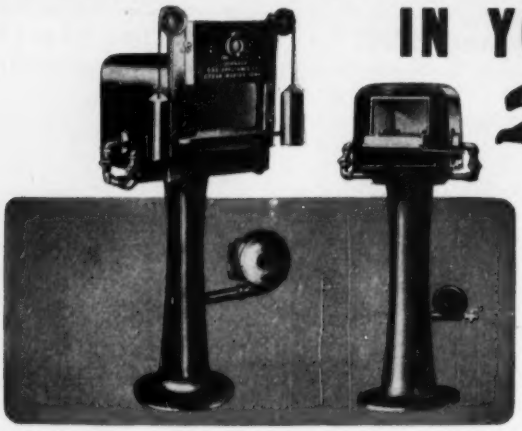
Seneca Falls engineers are at your disposal. Let us help solve your turning problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing

HIGH SPEED HEAT TREATING IN YOUR OWN PLANT

Quick Acting JOHNSON FURNACES



No. 130A Hi-Speed. For steels requiring 1400 to 2300° F. Firebox 7¾ x 13 x 16½. Complete with Carbofrax hearth and Johnson Blower $295.00

No. 120 Hi-Speed Reaches 1,500° F. in 5 minutes. 2,300° F. in 30 minutes. Firebox 5 x 7¾ x 13½. Complete with Carbofrax hearth, Johnson Blower $145.50

All Prices F.O.B. Factory

Heat treat high speed steels, harden high carbon steels, braze carbide tipped tools in your own plant. Save time and gas with *Quick Acting* JOHNSON Hi-Speed Furnaces on the job.

Turn on the heat and they're ready for action to produce high uniform temperatures FAST at low fuel cost. Temperatures are easily regulated with accuracy.

Install *Quick Acting* JOHNSON units in your plant now. Their low initial cost is soon paid for in increased plant efficiency and operating economy.

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Pot Hardening, Melting & Annealing Furnaces — Burners — Torches — Blowers — Mixers — Valves

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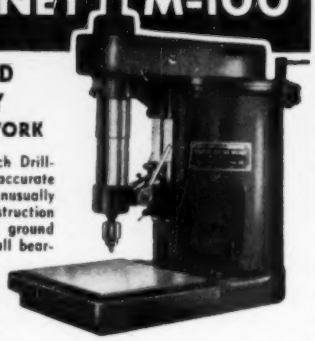
SIGOURNEY M-100



MAINTAINED ACCURACY IN PRECISION WORK

The Sigourney M-100 Bench Drilling Machine is extremely accurate on precision jobs. It is unusually sturdy and rigid in construction . . . has hardened and ground spindles . . . and sealed ball bearings throughout. All moving parts are entirely closed for maximum operator safety. M-100 is built for long and steady service.

This sturdily constructed bench drilling machine is available in 1, 2, 3, and 4 spindle models . . . speeds from 4,000 to 10,000 r.p.m.

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Division Niles-Bement-Pond Co. . . . . West Hartford, Connecticut

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The internal gage that's RIGHT for war production conditions

COMTORPLUG

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PATENTED EXPANDING INTERNAL COMPARATOR

⅛" to 8" dia.

War production conditions intensify the need for a gage that gives high precision yet is Rugged, Automatically Accurate, "Unrestricted".

Patented COMTORPLUG answers the need as no other gage can because—

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2) Trainees equal old hands in precision results, due to automatic alignment and "feel".

3) For Quality Control, gives actual measurement, and a fixed—not passing—reading.

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5) Cost is so reasonable as to be practical for all quantity gaging applications. Fits in with other gaging methods. Let it grow as it proves itself—which it WILL!

Inspection to fractional ten-thousandths of hydramatic airplane propeller distributor valve.

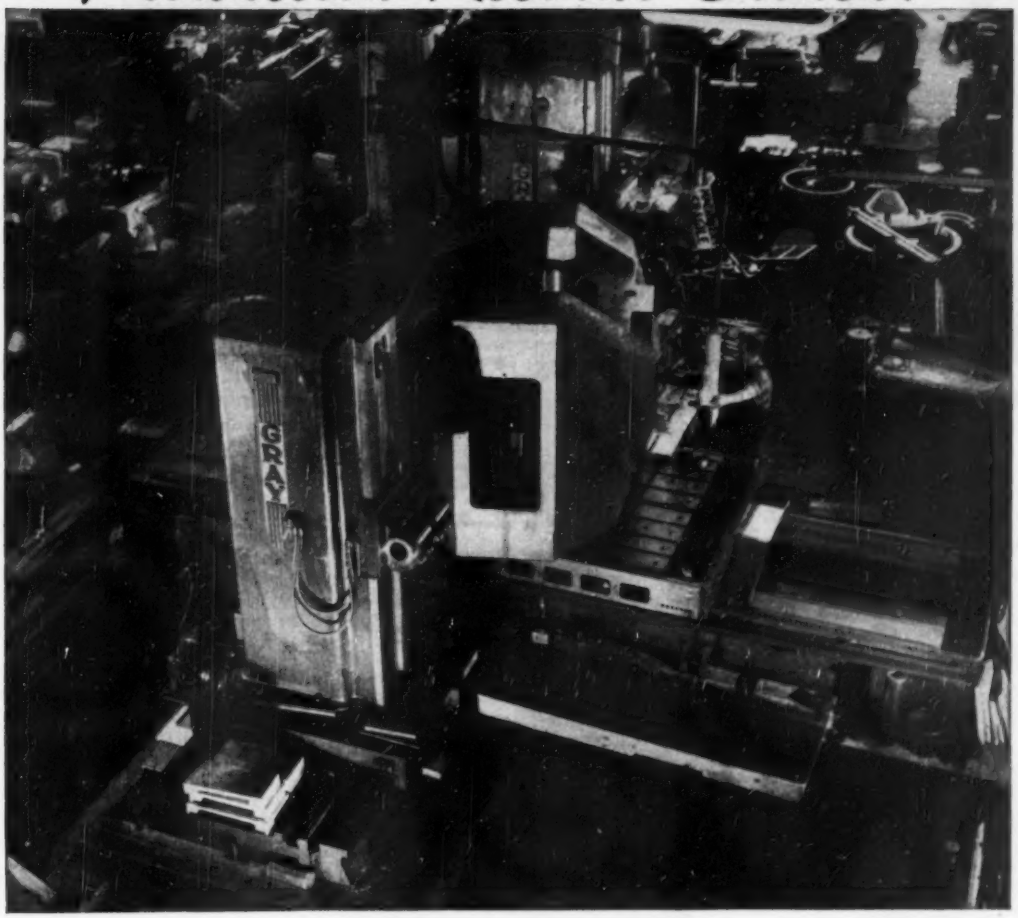
COMTOR CO.

68 Farwell St., Waltham 64, Mass.

Request "Bulletin 40"

For data on COMTORGAGE Precision External Gage, request Bulletin 30.

Production Records Broken!



THE simplicity and convenience of control that characterizes Gray Horizontal Boring, Drilling and Milling Machines is of special value on large work like this. These powerful, versatile machines are breaking production records throughout the country.

Write for fully illustrated descriptive Bulletins Nos. 48 & 54

The G.A. GRAY Company

planers • milling planers
planer type milling machines
horizontal boring machines

CINCINNATI 7, OHIO, U. S. A.

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HOURS OF POLISHING TIME SAVED - - SCALE, PITTING AND DECARBURIZATION ELIMINATED WITH . . .

ABBOTT

ABBOTT STEEL BALLS ARE COLD HEADED FROM MIRROR-LIKE DIES — HARDENED AT PROPER HEAT, NOT EXCEEDING 1600° F. USING

PHOENIX BRAND

TRADE MARK REG. U.S. PAT. OFF.

NON-SCALING COMPOUND

Above is shown a test cold heading, steel ball die after ordinary heat treating. Note surface discoloration, pitting and scale. Even after costly polishing operation, this die would probably be rejected.

Here is a hardened cold heading die Heat Treated with PHOENIX BRAND NON-SCALING COMPOUND. Note clear smooth scale-free surface. Saves TIME, saves money and of course better dies *last longer.*

"I have had over 16 years experience in Heat Treating," says Maurice Tirone, "and believe me the manufacture of steel balls is an exacting business. We used to reject 20% of all heading dies because of surface pitting or excess scale during heat treating.

"Now, with PHOENIX BRAND NON-SCALING COMPOUND we can harden up to twenty pieces in one furnace at one time . . . no scale — no pitting — no rejects and every die produces perfect ABBOTT BALLS."

Phoenix Brand Compound is easy to use — it goes on dry — solves heat treating problems — virtually eliminates costly polishing.

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WRITE for Literature and information and address of Mill Supplier nearest you.

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ASSURE your men that no layoffs will result from job improvements. Fear and insecurity are your greatest obstacles to employee cooperation on labor-saving devices.

PREPARE the way for changes you contemplate. Show your men the benefits of the move. Keeping it under cover and springing it suddenly only arouse suspicion as to your motives.

FIRTHITE

INDUSTRY STANDARDS CARBIDE TIPS AND BLANKS

You can do it *Better, Faster, Cheaper* with *Firth Sterling*

FIRTHITE TIPS and BLANKS

BETTER—Firthite tips are manufactured to uniformly close tolerances. Rigid quality control from raw material to finished product assures the Firthite user of a cutting material of superior strength.

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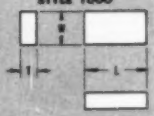
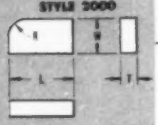
STANDARDS—STYLES 1000, 2000

STYLE 1000



STYLE 2000



STYLES 2000, 3000-4000

Tips furnished with following radii:

WIDTH

1/8" thru 1/4"
9/32" thru 3/8"
over 3/8"

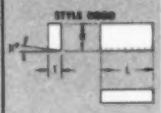
RADII

1/8", 3/16", 1/4"

DIMENSIONS IN INCHES			TIP NUMBER		T-04, TA, T-16, H, HA	T-31 HE	Std. Pkg. Qty.
Thickness	Width	Length	Style 1000	Style 2000			
1/16	1/8	5/8	1010	2010	All Sizes Stocked in These Grades	**	50
	3/16	1/4	1020	2020		x	50
	1/4	1/4	1025	2025		x	50
	1/4	5/16	1030	2030		x	50
3/32	3/16	5/16	1040	2040		..	50
	3/16	1/2	1050	2050		..	50
	1/4	3/8	1060	2060		x	50
	1/4	1/2	1070	2070		x	50
	5/16	3/8	1080	2080		x	50
	3/8	3/8	1090	2090		x	25
	3/8	1/2	1100	2100		..	25
	7/16	1/2	1105	2105		..	25
1/8	3/16	3/4	1110	2110		..	25
	1/4	1/2	1120	2120		..	25
	1/4	5/8	1130	2130		..	25
	1/4	3/4	1140	2140		..	25
	5/16	7/16	1150	2150		..	25
	5/16	1/2	1160	2160		..	25
	5/16	5/8	1170	2170		..	25
	3/8	1/2	1180	2180		..	25
	3/8	3/4	1190	2190		..	25
	1/2	1/2	1200	2200		x	25
	1/2	3/4	1210	2210		..	25
	3/4	3/4	1215	2215		..	10
5/32	3/8	9/16	1220	2220		..	25
	3/8	3/4	1230	2230		..	25
	5/8	5/8	1240	2240		..	25
3/16	5/16	7/16	1250	2250		..	25
	5/16	5/8	1260	2260		..	25
	3/8	1/2	1270	2270		..	25
	3/8	5/8	1280	2280		..	25
	3/8	3/4	1290	2290		..	25
	7/16	5/8	1300	2300		..	25
	7/16	13/16	1310	2310		..	10
	1/2	1/2	1320	2320		..	25
	1/2	3/4	1330	2330		..	10
	3/4	3/4	1340	2340		..	10

STANDARDS—STYLES 0000, 1000, 3000, 4000

STYLE 0000



STYLE 3000 (left hand) shown below

STYLE 4000 (right hand)

DIMENSIONS IN INCHES			TIP NUMBER				T-04, TA, T-16, H, HA	Std. Pkg. Qty.
Thickness	Width	Length	Style 0000	Style 1000	Style 3000	Style 4000		
1/4	3/8	9/16		1350	3350	4350	All Sizes Stocked in These Grades	25
	3/8	3/4		1360	3360	4360		10
	7/16	5/8		1370	3370	4370		10
	1/2	3/4	0380	1380	3380	4380		10
	9/16	1	0390	1390	3390	4390		10
	5/8	5/8		1400	3400	4400		10
	3/4	3/4		1405	3405	4405		10
	3/4	1	0410	1410	3410	4410		10
5/16	7/16	5/8		1420	3420	4420		10
	7/16	15/16		1430	3430	4430		10
	1/2	3/4		1440	3440	4440		10
	1/2	1		1450	3450	4450		10
	5/8	1	0460	1460	3460	4460		10
	3/4	3/4		1470	3470	4470		10
	3/4	1		1475	3475	4475		5
	3/4	1-1/4	0480	1480	3480	4480		5
3/8	1/2	3/4		1490	3490	4490		10
	1/2	1	0500	1500	3500	4500		10
	5/8	1	0510	1510	3510	4510		5
	3/4	1-1/4		1520	3520	4520		5
	3/4	1-1/2	0525	1525	3525	4525		5
1/2	3/4	1		1530	3530	4530		5
	3/4	1-1/4	0540	1540	3540	4540		5
	3/4	1-1/2	0550	1550	3550	4550		5

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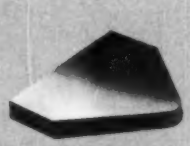
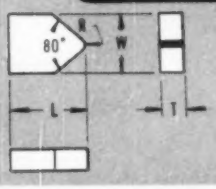
STYLE 5000—POINTED and ROUND NOSE TOOL TIPS





DIMENSIONS IN INCHES			TIP NUMBER	T-04, TA, H, HA	Standard Package Quantity
T	W	L			
1/16	1/4	5/16	5030	ALL SIZES STOCKED IN THESE GRADES	50
3/32	5/16	3/8	5080		50
3/32	3/8	1/2	5100		25
3/32	7/16	1/2	5105		25
1/8	1/2	1/2	5200		25
5/32	5/8	5/8	5240		25
3/16	3/4	3/4	5340		10
1/4	1	3/4	5410		10

MECHANIGRIPT INSERTS FROM STOCK
STYLES SC, TB, SQ, RB

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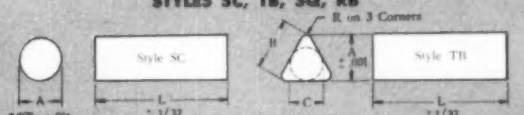

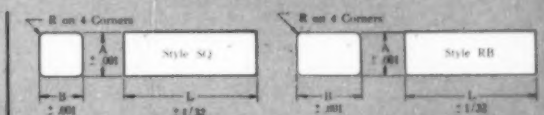

Insert No.	DIMENSIONS A	B	C	L	R	GRADES STOCKED T-16	TA	HA	H	Std. Pkg. Qty.
SC-1212	3/8			1-1/2		*	*	*		5
SC-1612	1/2			1-1/2		*	*	*		5
TB-81222	.343	.387	1/4	1-1/2	1/32	*	*	*		4
TB-12123	.515	.581	3/8	1-1/2	3/64		*	*		4
TB-16124	.687	.774	1/2	1-1/2	1/16		*	*		2

Insert No.	DIMENSIONS A	B	C	L	B	GRADES STOCKED T-16	TA	HA	H	Std. Pkg. Qty.
SQ-12122	3/8	3/8		1-1/2	1/32	*	*	*		4
SQ-16123	1/2	1/2		1-1/2	3/64		*	*		4
SQ-24124	3/4	3/4		1-1/2	1/16				*	4
RB-6123	3/8	3/4		1-1/2	1/16		*		*	4

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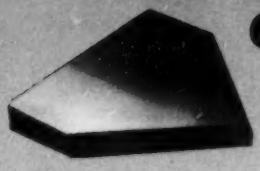
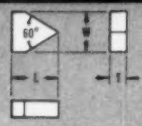
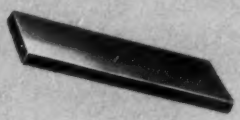
STYLE 6000 60 THREADING TOOL TIPS

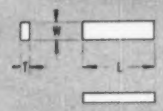




DIMENSIONS IN INCHES			TIP NUMBER	GRADES STOCKED	Standard Package Quantity
T	W	L		T-04, TA, HA	
3/32	5/16	3/8	6080		50
3/32	3/8	1/2	6100	ALL SIZES	25
1/8	1/2	1/2	6200	STOCKED IN	25
5/32	5/8	5/8	6240	ABOVE GRADES	25
3/16	3/4	3/4	6340		10

STYLE ST SCRAPER TIPS

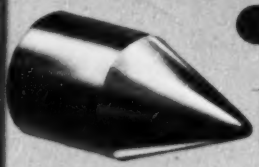


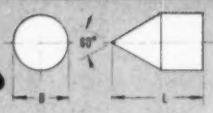


FURNISHED AS STANDARD IN GRADE HA

DIMENSIONS IN INCHES			TIP NUMBER	Standard Package Quantity
T	W	L		
3/64	3/32	1	ST-1	50
1/16	1/4	1	ST-2	25
3/32	1/4	1	ST-3	25
1/8	1/4	1-1/4	ST-4	25

STYLE LC LATHE and GRINDER CENTER TIPS



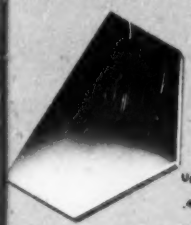


O.D. Centerless Ground W +.000 −.002

FURNISHED AS STANDARD IN GRADE H

DIMENSIONS IN INCHES		STANDARD TAPER NUMBER			TIP NUMBER	Standard Package Quantity
Diameter	Length	MORSE	JARNO	BROWN & SHARPE		
1/4	7/16	1	4, 5	5, 6	CT-40	10
5/16	9/16	2		7	CT-50	10
3/8	11/16		6, 7	8	CT-60	10
1/2	7/8	3, 4	8, 9, 10, 11	9, 10	CT-80	5
5/8	1-1/16	5, 6	12, 13, 14	11, 12	CT-100	5
3/4	1-1/4			13	CT-120	2
7/8	1-3/8	7			CT-140	2

STYLE MD MASONRY DRILL TIPS



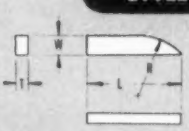
W
Up to .400 +.030 +.045
.400 to 1.040 +.030 +.030
Over 1.040 +.035 +.075

L
Up to 3/8 +.015 −.000
Over 3/8 +.030 −.000

For Drill Diam.	DIMENSIONS IN INCHES T	W*	L*	TIP NUMBER	Std. Pkg. Qty.	For Drill Diam.	DIMENSIONS IN INCHES T	W*	L*	TIP NUMBER	Std. Pkg. Qty.
3/16	.025/.030	.208	.208	MD-3	50	11/16	.081/.091	.723	.598	MD-11	25
1/4	.040/.045	.270	.270	MD-4	50	3/4	.081/.091	.785	.598	MD-12	25
5/16	.050/.060	.338	.368	MD-5	50	7/8	.081/.091	.915	.728	MD-14	25
3/8	.050/.060	.400	.368	MD-6	50	1	.081/.091	1.040	.728	MD-16	10
7/16	.050/.060	.468	.468	MD-7	25	1-1/8	.081/.091	1.170	.858	MD-18	10
1/2	.081/.091	.535	.472	MD-8	25	1-1/4	.112/.122	1.295	.858	MD-20	10
9/16	.081/.091	.597	.472	MD-9	25	1-1/2	.112/.122	1.545	1.045	MD-24	10
5/8	.081/.091	.660	.598	MD-10	25						

*The width and length are supplied over-size as indicated above.

STYLE RT REAMER TIPS



FURNISHED AS STANDARD IN GRADES HA AND T-16

DIMENSIONS IN INCHES T	W	L	TIP NUMBER	Std. Pkg. Qty.	DIMENSIONS IN INCHES T	W	L	TIP NUMBER	Std. Pkg. Qty.
1/32	1/16	1/2	RT-1	50	1/16	13/64	3/4	RT-7	25
3/64	3/32	1/2	RT-2	50	1/16	17/64	3/4	RT-8	25
3/64	3/32	11/16	RT-3	50	1/16	5/16	3/4	RT-9	25
1/16	1/8	11/16	RT-4	50	1/16	3/8	3/4	RT-10	25
5/64	1/8	7/8	RT-5	50	3/64	3/32	1	RT-11	50
3/32	3/16	7/8	RT-6	25					

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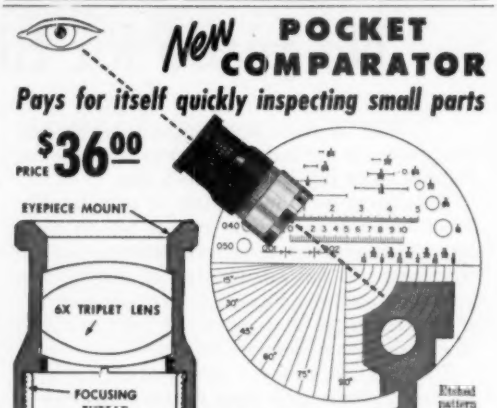

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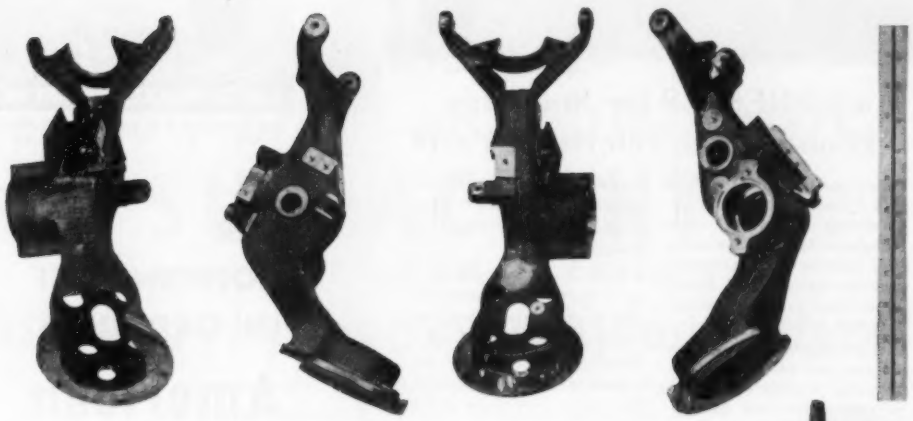
Jig Borer Precision Production

31 HOLES—bored, tapped, recessed
20 MILLING CUTS
} ALL WITHIN 0.0005"

PRODUCED ON THE MOORE JIG BORER



Take a good look at this precision part. It's magnesium, and has a total of 31 holes—some bored, some tapped, and 2 large ones recessed. There are 20 separate milling cuts. In addition, the base and the bevel on base are turned. All these faces and holes are held to 0.0005". Imagine how many operations it would take, the number of different machines needed, and the time expended in producing 100 of these parts.

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The speed, accuracy and simplicity of operation of the Moore Jig Borer are the results of a combination of time-proven features, including hardened, ground and lapped lead screws for precise, rapid table settings within .00015" by coordinate location; infinitely variable spindle speeds—push-button controlled—from 75 to 2400 RPM; three power-feed ratios—.0015", .003" and .006"—per revolution of spindle in either direction; centralized control panel; disconnect clutch for easy indicating and totally enclosed drive mechanism.

Write for the new 24-page No. 2 Jig Borer catalog, which contains complete design specifications, describes Jig Borer accessories and gives further examples of Jig Borer jobs—in the toolroom and on the production line.

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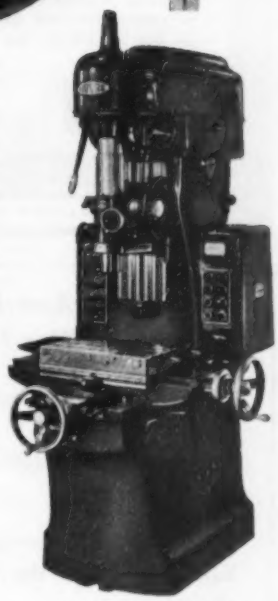

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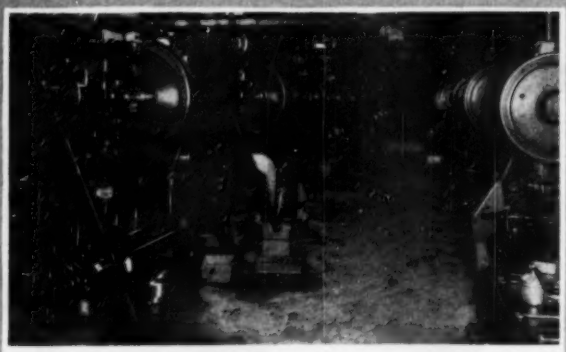

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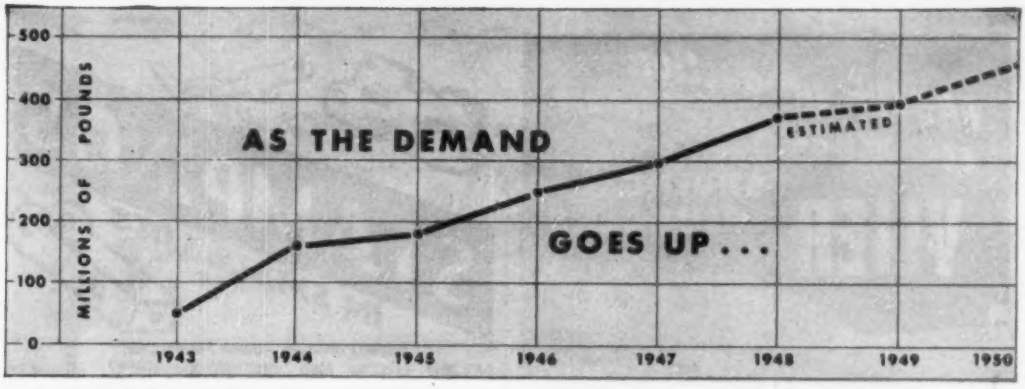

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. . . in a complete series with varying properties and degrees of water-solubility—and from clear liquids to pastes and waxes

Steadily the demand increases—as industry after industry finds new and wider uses for surfactants. This young industry has already surpassed synthetic rubber in its tonnage!

The *non-ionic* surfactants are in particular demand by the makers of cleansers of every type—for the home, commerce and industry—insecticides, cosmetics, metal cleaning compounds, oils, waxes and other products.

In keeping with this trend, Antara announces new low prices—reductions of 13% to 15%—on the A-200 and A-400 Series of non-ionic surfactants. Such reductions mean that these superior agents are now priced for use by many additional compounders.

We invite your inquiry for Data Sheets and the new prices. Extensive research staffs and facilities support the development and application of all Antara Surfactants—available to work with you in the improvement of an existing product or the development of a new one. Your inquiry is invited —without obligation. It will bring a prompt opinion as to whether one of the Antara Surfactants may be adaptable to your needs. Kindly address your inquiry to Department 47.

APPLICATIONS

Detergents	Foamers
Emulsifiers	Anti-static agents for polystyrene plastics
Wetting Agents	
Dispersants	
Penetrants	Solubilizers

ANTARA® PRODUCTS

SURFACTANTS . . . CARBONYL IRON POWDERS

GENERAL ANILINE & FILM CORPORATION

444 MADISON AVENUE, NEW YORK 22, NEW YORK

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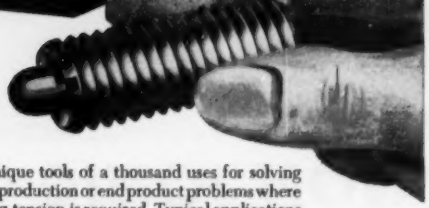
In Canada: CHEMICAL DEVELOPMENTS OF CANADA LIMITED, LEASIDE, TORONTO 17

FASTER production
ECONOMICAL end product use
VLIER SPRING PLUNGERS



...unique tools of a thousand uses for solving your production or end product problems where spring tension is required. Typical applications shown here are only a few of the ways that VLIER spring plungers will sharply reduce your costs.

Each plunger has a rust-resistant, case-hardened head that telescopes completely into the body. Spring pressures are pre-set and constant. Body has national coarse class No. 1 threads to prevent "freezing" in the fixture. Write today for a catalog showing the complete VLIER line.

TYPICAL APPLICATIONS: Production

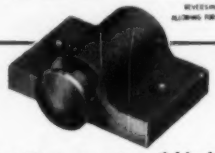
Spring plunger incorporated with die to break oil seal between work and die surfaces.

Use as a stop or tooling pin to locate thin metal parts before clamping.

Spring plunger mounted in drill jig to provide a "forward and over" tension on the work piece.

End product uses

VLIER SPRING STOPS



For use where fixture wall sections are not available for mounting spring plungers. Jig-drilled flanged base—accurate spring tension—case hardened, radiused plunger.

TYPICAL USERS OF VLIER PRODUCTS INCLUDE:
American Can Co., Bell & Howell Co., Black & Decker Mfg. Co., Crane Co., Douglas Aircraft Co., Inc., International Business Machines Corp.

"Unique Products for All Industries"

VLIER MANUFACTURING CO.
4552 Beverly Boulevard, Los Angeles 4, California

Precision Die Made—Lowest Possible Cost.
DAYTON ROGERS MFG. CO., Minneapolis 7, Minnesota

HOLMAN
BETTER, FASTER HOLE FINISHING

HELICAL TAPER PIN REAMERS

Scientifically made of selected steel under modern processes. Long lived, economical, accurate. Details on request.

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• HAND • SEMI AUTOMATIC • AUTOMATIC
Special Machinery
HEBERT Equipment Co. • Romeo, Mich.

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Patented Cutting Off Tool Holders
Patented Cutting Off Blades

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips MEANS MAXIMUM CUTTING EFFICIENCY.

Manufactured By
J. Milton Luers — 12 Pine St. — Mt. Clemens, Mich.
Produced under License Issued by John Milton Luers Patents Inc.

HARDNESS TESTER
The *Scleroscope* is the only hardness tester that takes in the entire range from the softest to the hardest metals without any adjustments.

MODEL D-1 DIAL TYPE
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TELEPHONE: JAMAICA 6-4090

STOP *Profit Leaks*

● It will pay you to make a careful survey of your present Press equipment. Find out how efficient each Press is—what equipment maintenance costs are running.

When you have analyzed each Press in relation to your present costs, let us show you how modern Cleveland Presses can reduce your production costs, improve your product and speed up deliveries. You may find it not only economical but imperative to replace old equipment with new in order to stop profit leaks.

2500 TON CAPACITY CLEVELAND KNUCKLE JOINT PRESS

Designed for embossing, coining, sizing, stamping, extruding or heading, this new Cleveland Press exerts a short but extremely powerful squeeze through its massive, carefully fitted knuckle. This Press shown here exerts a pressure of 2500 tons. However, this type can be furnished in various capacities from 50 tons up.

Stroke of Slide	10"
Adjustment of Slide	½"
Distance bed to slide, stroke down adjustment up	30½"
Area, face of slide	30" x 36"
Area, top of bed	42" x 48"
R.P.M.	14

Built in air cushion has a capacity of 50 tons at 75 lbs. of air pressure per square inch —3" travel.

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Established 1880

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FABRICATING TOOLS

POWER PRESSES

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CLEVELAND 14, OHIO

try a PARCO formulated CLEANER!

It costs more per pound. But it cleans better, goes farther, cleans more surface per pound of cleaner; it's an economical buy.

Parco Cleaners are specially formulated to clean and condition metal surfaces to provide a better base for finishes. They're formulated to reduce cleaning time, operating temperatures, and amount of cleaner used.

In the Parco Cleaner line there's bound to be one that's especially suited for your requirements. A production test with the Parco Cleaner that fits your need will save you money on cleaning. Write today!

- **Emulsion and Solvent Type**—Spray and immersion cleaners for removing oil, grease and soil from metal surfaces.
- **Acid Type**—Four cleaners for quick, effective removal of rust and scale from iron and steel.
- **Alkaline Type**—Light and heavy duty spray and immersion cleaners. For removal of oil, grease and soil from metal surfaces.

Bonderite, Parco, Parco Lubrite—Reg. U. S. Pat. Off.

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BONDERITE—Corrosion Resistant Paint Base • PARCO COMPOUND—Rust Resistant
PARCO LUBRITE—Wear Resistant for Friction Surfaces

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- LOW CHASER COST
- ALL AROUND DEPENDABILITY

Bulletins available: General Purpose Die Heads, Insert Chaser Die Head, Threading Machines.

H & G DIE HEAD

See our Advs. on Page 36 Feb. 10 '49 American Machinist

THE EASTERN MACHINE SCREW CORP., 28-40 Barclay St., New Haven, Conn.
Pacific Coast Representative: *A. C. Behringer, 854 N. San Pedro St., Los Angeles California.* Canada: *F. F. Barber Machinery Co., Toronto, Canada.*

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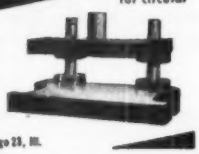
This low cost machine will handle internal keyseating jobs up to 1¼ in.

Write for illustrated bulletin.

DAVIS KEYSEATER CO., 403 Exchange St., Rochester, N. Y.

BAUMBACH *The* BEST IN DIE SETS
Write for circular

Being originators of Standard Die Sets naturally we are steps ahead in Design—Precision—Dependability and Economy. Because Baumbach Die Sets have demountable Leader Pins and Bushings, Die Set inventory is reduced as well as costly machining time. Learn about Baumbach superiority before you buy.



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HARDENED JAWS

Send for full details on imported micrometers and calipers

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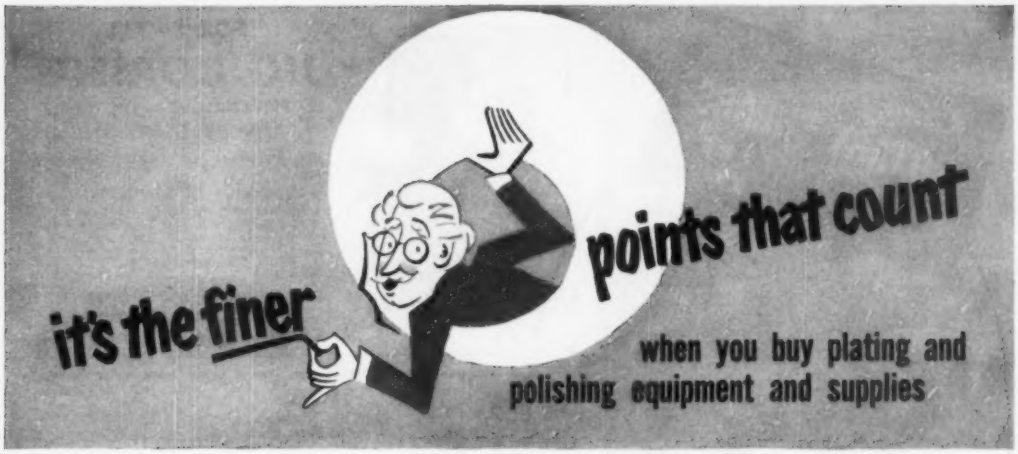

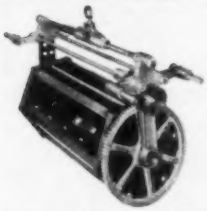

Ask yourself these questions about plating barrels: Will they withstand high acid and alkali solutions? Will they function smoothly under continuous production, be unaffected by sudden temperature changes? Are they ribless type designed for increased plating capacity and reduced maintenance? With these essentials built in you can confidently load the cylinder and run it through the entire plating cycle with no need to transfer parts. H-VW-M Mercil Type Plating barrels include all these finer points . . . are described in Bulletin PB-107.

Never forget, using the RIGHT cleaner means a better product. A complete cleaning job eliminates poor adhesion, tarnish or blisters, whether you soak clean or electro-clean. Remember, too, there's a specific cleaner to do the job right . . . *a complete cleaning job* . . . on every type of metal . . . for every type of soil. H-VW-M Matawan Cleaners are available for every type of cleaning job. They are described in detail in Bulletin C-106, together with recommendations for cleaning all commonly used metals.

Remember, the type of solution determines the type of tank and lining. H-VW-M supplies tanks for all types of electroplating, pickling, cleaning, rinsing and similar treatments. Lined and unlined welded steel tanks, lined and unlined wood tanks, earthenware tanks . . . there's the correct type and style available for every kind of solution. Bulletin T-105 describes them in detail, has useful facts and suggestions to help you select the tanks best suited to your operation. Send for it.

You'll be sure of the finer points that make the difference if you always remember . . . you can always get what you want from H-VW-M when you want it . . . H-VW-M products are strategically warehoused for prompt service and delivery . . . H-VW-M sales-engineers and laboratory technicians are always available for help in your production problems. It is this overall service and experience that have made H-VW-M *the central source of supply . . . for over 70 years . . . for all the needs* of the electroplating and polishing industry.

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Plants at: Matawan, N. J. • Anderson, Indiana • *Sales Offices:* Anderson • Chicago • Cleveland • Dayton • Detroit • Grand Rapids Matawan • Milwaukee • New Haven • New York • Philadelphia Pittsburgh • Rochester • Springfield (Mass.) • Stratford (Conn.) • Utica

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Kling
ROTARY SHEARS
DO MANY TYPES OF WORK

DOES ALL THIS WORK FOR YOU

1. CUTS STRAIGHT LINES
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4. MAKES FLANGES
5. CUTS INSIDE HOLES WITHOUT CUTTING IN FROM EDGES
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8. BEVELS OF ANY ANGLE
9. CUTS REVERSE CURVES
10. BEADS & U'S

ALL WITH Hairline PRECISION

Yes, and With Hairline Precision

Rapid operation . . . Hairline Accuracy . . . the use of Kling Rotary Shears marks the latest development in cutting mild steel, and sheet metal, up to 1-inch with amazing savings in time, labor and production costs.

For exacting projects (see illustration at the right), no single unit of metal-working equipment does so many different things so cleanly and efficiently as does the Kling Rotary, pictured above.

In metal-working plants, automotive, aviation, home appliance, and other industries, where work of this character is being done—this machine is held in high regard for its versatility and economy of operation.

This great usefulness is the result of half-a-hundred years of engineering experience which prospective buyers, with reason and respect, applaud.

Send Today for Bulletin No. 245

which will give you specific facts, and specifications. No obligation involved. Users of heavy equipment of Kling Rotary Shears' class will receive a copy of this Bulletin promptly, on request.

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JIG BORING
PUT SMALL JOBS ON THIS
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and save your larger machines for heavier work.

YOU'LL BE SURPRISED!

at the extremely low first cost and the vitally important jobs that this little precision machine can do. It will pay you to get our accuracy information on this machine which has 6" x 10" table movement and 7" x 17½" table size.

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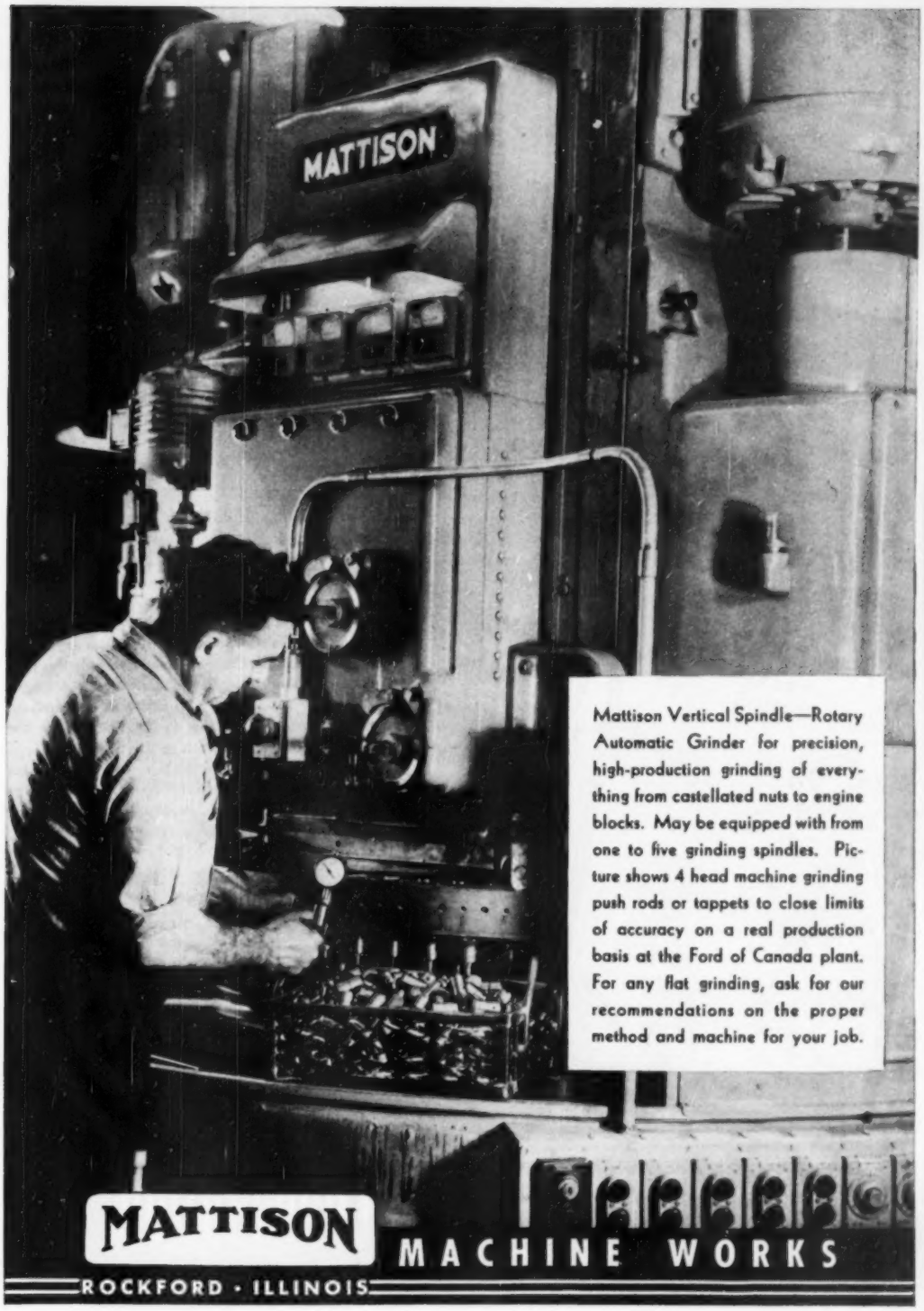


Mattison Vertical Spindle—Rotary Automatic Grinder for precision, high-production grinding of everything from castellated nuts to engine blocks. May be equipped with from one to five grinding spindles. Picture shows 4 head machine grinding push rods or tappets to close limits of accuracy on a real production basis at the Ford of Canada plant. For any flat grinding, ask for our recommendations on the proper method and machine for your job.

MATTISON MACHINE WORKS

ROCKFORD · ILLINOIS

7 Reasons why mills use Talide Rolls

Talide Work Rolls

Solid Carbide Rolls
(weighing up to 1000 pounds)
for Strip or Sheet

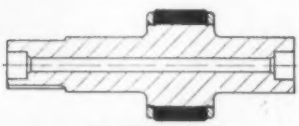
1. MORE PRODUCTION
2. BETTER FINISH
3. HIGHER SPEEDS
4. LESS DOWN TIME
5. CLOSER TOLERANCE
6. GREATER REDUCTION
7. FEWER REJECTS

● Profitable, increased tonnage with Talide Carbide Rolls can be had Mills regularly report astounding new figures. What's more, increased operating speeds and improved surface finish make subsequent polishing and buffing unnecessary.

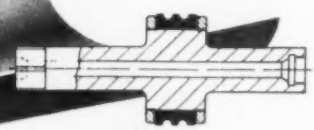
Talide Tungsten Carbide Rolls are used for ordinary finish or mirror-finish on such items as cold rolled stainless, spring steel, razor steel, alloys, carbon, aluminum foil, tinsel ribbon and flat wire.

Metal Carbides Corporation originally developed the art of making Carbide Rolls, and only this firm makes solid or sleeved Talide Carbide Rolls weighing up to 1000 pounds. Available in diameters up to 10" and lengths up to 40" We make the smallest and largest rolls in the world!

Write us today. We'll show you how to get *more production, better finish, higher speeds, less down time, closer tolerances, greater reductions* and *fewer rejects* on your mill operations



Sleeved Rolls for Flat Wire



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METAL CARBIDES CORPORATION
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YOUNGSTOWN 5, OHIO *Pioneers in Tungsten Carbide Metallurgy*

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New Erickson "Donut" Design Air Cylinder

BAR STOCK PASSES THROUGH FOR SPEEDIER MACHINING

Hand-operated drawbar mechanisms are completely forgotten when an Erickson "Donut" Design Air Cylinder is on the job. All the operator does is touch the air control valve—the cylinder does the rest.

When combined with an automatic bar feed, the Erickson "Donut" Design Air Cylinder provides for *fully automatic* handling of stock.

EXCLUSIVE Lever Arrangement

By a unique use of the mechanical advantage of levers, an Erickson Air Cylinder of 8½" overall diameter produces drawbar force equal to that of a standard 14" diameter cylinder. Danger of work slippage? Not with gripping power made available through this set-up!

GET INCREASED PRODUCTION FROM *YOUR* TURRET LATHES

How can you get more production from your turret lathes on bar stock operations?

Simple! Convert from *hand-operated* chucking devices to automatic chucking and release with Erickson's New Lever Type "Donut" Design Air Cylinder.

With a movement of 1/8", this single-acting cylinder can be set up for either push or pull mechanisms.

Why not find out now how your turret lathes can be converted to handle bar stock automatically! The result is increased production.

Erickson "Donut" Design Air Cylinder available in 3 models handling stock ranging from 3/32" to 2-1/8" diameter.

Write Today
TO: DEPT. 2302-E
for full details on how the Erickson Air Cylinder can be applied to your turret lathes.

Erickson Tools Division of The Erickson Steel Co.
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★

DEMPSTER DUMPSTER SYSTEM

SERVING COST-MINDED MANAGEMENT FROM COAST TO COAST

. . . handling bulk materials of every description at phenomenal savings

Photos show the three simple stages of servicing a container. The Dempster-Dumpster, operated from hydraulic controls by driver in the cab, picks up each container and hauls it to point of disposition where it may be dumped or set down intact.

★ GULF – *recognized across the nation*

. . . Gulf Oil Corporation, well known for sound management, uses the Dempster-Dumpster System

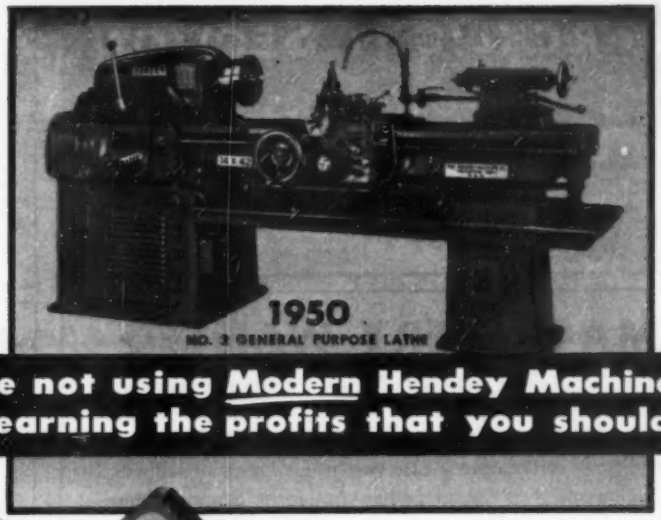
Gulf Oil Corporation is among the hundreds of well managed manufacturers, both large and small, who use the Dempster-Dumpster System of bulk materials handling . . . the system recognized across the nation for its efficiency and ability to reduce costs.

There is never an idle moment for a truck mounted Dempster-Dumpster around a manufacturing plant. With a variety of Dempster-Dumpster containers spotted inside and outside your plant, one Dempster-Dumpster, with only one man, the driver, is kept busy servicing one pre-loaded container after another. These detachable containers, ranging in size up to 12 cu. yds., carry pay-loads equal to conventional truck bodies. They are built in a wide variety of designs best suited to the type of materials handled—be they bulky, light or heavy . . . solids or liquids . . . trash or rubbish.

In addition to amazing increases in man-power efficiency . . . greatly reduced investment, and maintenance costs, the Dempster-Dumpster System improves "housekeeping" methods . . . reduces fire hazards . . . provides an easier, quicker, safer and more efficient manner of handling materials. It will pay you to investigate the Dempster-Dumpster System now! A product of Dempster Brothers, Inc.

One Dempster-Dumpster Services All Containers. . . All Designs. . . All Sizes

DEMPSTER BROTHERS, 490 Dempster Building, Knoxville 17, Tennessee

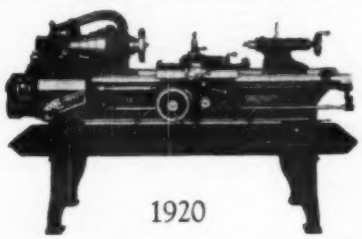


. . . If you are not using Modern Hendey Machines you are not earning the profits that you should!

THE HENDEY MACHINE CO.
HARDENED AND GROUND BED WAYS

The new Hendey No. 2 General Purpose Lathe is the ultra-modern successor of the famous Hendey Cone Head Lathe and was designed especially to perform tool room work with the greatest ease—at the greatest profit. A single lever instantly shifts the belt to any of the eight spindle speeds. There is an independent motor in the base and a unique design feature that completely eliminates belt pull on the spindle. The operator has a choice of 48 thread and speed changes. Both the carriage and tailstock ways are induction hardened and precision ground. Other *plus* features include cam lock or long taper key drive spindle noses—preloaded, super-precision spindle bearings—automatic lubrication—a swing of 16" and a wide choice of bed lengths.

This is truly a modern lathe to meet modern tool room requirements. Write for catalog.



Thousands of these old Hendey Cone Head Lathes are still in use throughout the world. Compare their performance against the new No. 2 General Purpose. The old Cone Head has overhead, manual belt shifting. Belt pull is direct on spindle from countershaft drive or motor on bracket. Top speed is 465 R.P.M. Bed is hand scraped, soft cast iron. A wonderful machine in its day, but not adequate for today's needs. How many of these in your shop? . . . losing money!

Continuous, advanced engineering by Hendey is worth watching—and must be watched if you are to earn full profits from your lathes and shapers. For complete particulars and prices, contact your nearest Hendey office.

MODERN Hendey

THE HENDEY MACHINE COMPANY
MAIN OFFICE & PLANT: TORRINGTON, CONN.
BRANCH OFFICES: New York, Chicago, Boston, Detroit, Rochester, Los Angeles, San Francisco
REPRESENTATIVES: Philadelphia, Cleveland, Pittsburgh

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90c per line, minimum 4 lines. To figure advance payment count 5 average words as a line.

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Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Individual Spaces with border rules for prominent display and advertisements.

The advertising rate is **$9.00** per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞" vertically on a column—3 columns—30 inches to a page.

New advertisements received at the New York Office, by Sept. 19th, will appear in the Oct. 2nd issue.

MACHINERY WANTED

Estimated cost about $315,000. We have been commissioned to purchase used machine tools for account of an important client. We offer you all or any portion of this business, if you have for immediate or early future release, surplus used machine tools, such as Engine and Tool Room Lathes, Automatic Screw Machines, Milling Machines, Shapers, Jig Borers, and similar machinery. Please advise us what machines you may be able to release and where located. Our representative will inspect without obligation to you and we will negotiate fair and equitable price. Terms: Immediate cash payment.

OFFERINGS RESPECTFULLY INVITED

ASSET REALIZATION COMPANY
HERBERT I. SEGAL, President
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NOTE: Our clients may possibly consider purchase of entire plant including real estate.

WANTED GOOD GOING BUSINESS

East of Miss. Will purchase entire business or assets. Must have good record of earnings. Present management may be retained. Brokers protected.

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WANTED—
MORE STAINLESS STEEL & ALUMINUM
Sheets • Strip • Wire • Rod Tubing
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PROMPT REMOVAL
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CONTRACT WORK

SCREW MACHINE PRODUCTS

We have open capacity on 4- 6- & 8-spindle automatic bar machines up to 1¼" capacity. Also 2¼" capacity on single spindle automatics and universal turret lathes. Complete service including heat-treating, grinding and plating.

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10 to 100 Ton Cap.
Also Steel Sheets, Strip Steel Coils
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PATTERNS in WOOD and METAL
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us—we will take care of them
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At Your Service . . .

The Searchlight Section is at your service for bringing business needs or "opportunities" to the attention of men associated in executive management, sales and responsible technical, engineering and operating capacities with the industry served by this publication.

MECHANICAL ENGINEER FOR SALES WORK

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before U.S. Patent Office, Validity and infringement investigations and opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine and Rommel, Registered Patent Attorneys, Suite 453, 815 15th Street, N.W., Washingon 5, D.C.

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Fay Automatic, 12"x81".
Lodge & Shipley Duomatic 2A

BORING MILLS
Giddings & Lewis No. 0, No. 25T.
Lucas No. 21, horiz.
Heald #49 double spindle, #48A Borematics
Universal 3" horiz. equipped.
Bullard 24", 36", 42" VTL
King 72", 42" vertical

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Barnes No. 242, No. 5 Morse
Carlton 8'-19" column
Canedy-Otto 3'-9" col.
Sibley 24"-28", Power Feeds
Hamilton, Langelier, Hi-Speed.

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Deckel G2, 2 dimen.
Gorton Cutter Grinders 375-2, 285-6.

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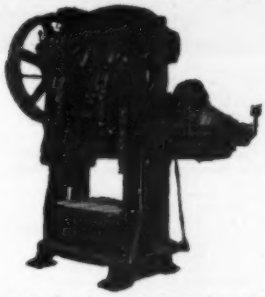
Fellows #7, 72, 712, 725, 7125, High Speed.
Fellows 645Y Spur & Spiral
Gleason #2 Surface Hardener.
Gleason 3" Spur Bevel Generator
Michigan, Gleason, Fellows Checkers.
Mikron Gear Hobber.

GRINDERS, MISCELANEOUS
Brown & Sharpe No. 5 cyl. 2" x 18", 3" x 12".
B. & S. Nos. 1, 2, 3 Univ.
B. & S. No. 13 Univ. & Tool.
Bryant #16 Internal
Cinn. 12x48", & 12x36" Filmatic Univ.
Cinn. #2 Univ. Tool & Cutter
Covel No. 91A Univ. T. & C.
Dalzen Thread, latest
Gardner #226, 30" Disc.
Hanchett #228 Disc. Dbl. opposed w. M.D. Feed.
Heald 72A3 Sizematic Int. Centerless, 51 Internal. Gage-matic
K.O. Lee Tool & Cutter.
Landis, 10x24" type C Univ., 10x36" angu., centreless
Norton No. 2 Tool & Cutter, Hyd.
Oliver 510 Drill Grinder, Sellers 4G Drill Grinder
Wickman Profile

GRINDERS, SURFACE
Abrasive No. 33, 34 Vert. 8x24.
Blanchard No. 11, 16" Mag. Chuck.
Blanchard #16A—30" Chuck
Blanchard #18-30" Chuck
Brown & Sharpe #5, 8x24"
G & L Hyd. #25, 6x18", #35, 8x24", #45, 12x24".
Hanchett Model 300, 13 x 48".
Norton 6x18", and 10x36" Hyd.
Reid No. 2A F.P. MIB.
Reid No. 2C Motor Spdl. Hand Feed.
Thompson Hyd. 6 x 10 x 18", 6 x 12 x 18"

LATHES
Bradford 14"x8', G.H. Latest Sebastion 12"x4'
Hardinge Precision, 1" Collet Cap.
Hendey 12" x 42" GH.
LeBlond Heavy duty 16"x30".
LeBlond Regal 10"x3¼', 13"x24". 15"x30", 16"x48" T.A. 19"x48". T.A. 21"x80"
Lodge & Shipley 20"x54" G.H. 24 Spindle Speed latest
Lodge & Shipley 16 x 78" T.A., Collets, etc., 20"x54" 24 speed G.H.
Monarch 10"x20" KE.
Monarch 12x30" Dble. Compound, 18", 12"x30" CKK
Rivett 608 QCG, TA, Precision
South Bend Q.C.G., 13"x6', 10"x4'



Bliss Double Crank Toggle Press No. 406—48"

Bliss #½A Toggle Press Geared, 1½ Toggle
Bliss No. 304A, 306, 78½ (330 Ton) Straight Side Presses.
Bliss 645B, 650 High Production Presses.
Henry & Wright 75 Ton Dieing Press.

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MANUFACTURER	TON CAP.	STR.	OPENING	PLATEN
Lake Erie	500	36"	68½"	35 x 36
H.P.M. Double Action	500	24"	30"	36 x 36
Watson Stillman Shaft Straightener	500	24"	57"	24" bed.
Denison	25/50	18"	23"	22 x 20
Hamilton	50	20"	30"	22 x 30
Southwark, D. A. Clamping Plate	125	30"	2' to 4'	84 x 30
Oliver Shaft Straightener	35	8"	12"	84 x 11

DOWN MOVING RAM, WITHOUT POWER UNIT

Mesta	750	42"	80"	44 x 44
Chambersburg	300	10"	27"	22 x 36
Southwark	350	42"	78"	28 x 48
Southwark	550	23"	48½"	42 x 32

UP MOVING RAM PRESSES

Southwark	600	20" 27" to 48"		34 x 24
Waterbury Farrel	800	4½"	28"	22 x 24
Birdsboro	800	20" 30" to 48"		40 x 32
Watson Stillman	300	12"	21"	24 x 20
Watson Stillman	300	12"	19"	20 x 20
HPM	180	15"	14½"	30 x 30
Dunning & Boschert Molding Press	300	12"	38"	24 x 32 Mold
Stokes Molding Press and Pump	150	8"	31"	24 x 23
Elmes—With Elec. Plates	50	6"	12"	18 x 18
Stewart Boling	85	10"	19"	20 x 20

WHEEL PRESSES
NILES — 600 ton 96"; 500 ton — 48"; 300 ton — 48.

INJECTION MOLDERS

ACCUMULATORS

Mfr.	Size	Pounds
HPM	6" x 9"	2000
General Electric	15" x 11'	400
Watson Stillman (13 gal) Hydr. Pass.	42 x 9 x 48"	3000

MILLS, PRODUCTION
Brown & Sharpe, No. 000, 12, 21
Cincinnati No. 2-18 Mfg., 50-96 hydromatic
Kent Owens IV
U. S. Multimiller, 1 & 2 Spindles.
Sundstrand 00 Rigidmills

MILLS, PLAIN AND UNIVERSAL
B. & S. No. 2A Univ.
Cincinnati No. 3 Plain, 2M Plain
Cincinnati No. 2MH Univ., H.S.
Milwaukee 2HL, 2H Univ., H.S.
Milwaukee No. 2H Plain, 2 HL
Van Norman Duplex, 20, 36.

MILLS, VERTICAL
Brown & Sharpe No. 2 Standard.
Cincinnati No. 4, Hi-Power.
Gorton No. 6½ D Profiler
Morey No. 12M Profiler 2 sp.
Sipp MP5 Jig Borer
Fosdick #20 Jig Borer.
Pratt & Whitney #2 Jig Borer

PRESSES
Bliss No. 18, 19, 20, 21, OBI.
Bliss No. 304A, 4" Str. 23"x24" bed, S.S.
Bliss No. 645B, 650 Hi-Production, 58, 62, 42A, 162.
Bliss No. 4½ Double Action Cam Colton Tablet Presses.
Gen. Flexible Screw Press.
Henry & Wright Dieing, 75 Ton.
Z. & H. 30 Ton, O.B.I.
Stokes Tablet Presses, Model R & T, DD2.
V&O #01

TURRET LATHES
Acme No. 6 W Bar and Chuck, Acme Fox.
Bardons & Oliver No. 3, 1½" cap., No. 5, Chuck.
Brown & Sharpe 2F
Foster No. 3B.
Gisholt No. 4, Bar and Chuck, 2L, Saddle Type
Jones & Lamson #5 Univ. Preselector head, PRT
Warner & Swasey No. 4A 8" Cap.

MISCELLANEOUS
Band Saw: DoAll 36" Zephyr, Tannewitz No. 36M.
Bending Roll: Webb 1/4"x5', BR-3
Centering Machine: Sundstrand.
Comparator: J & L 14" pedestal & bench.
Hacksaw: Marvel Nos. 6 and 6A, 9A Automatic Feed.
Marking Machine: Noble & Westbrook
Notching Press: Ferracute C62.
Pin Machine: Nilson.
Profilers: Cinn. 360° 4 Sp., Morey 12M
Shaper: Cinn. 24" Universal. Sheldon 12" Brand New.
Rotary Shear: Quickwork 3/16" Cap, 36" throat circle cutting attach.
Honer: Micromatic Hydrohoner, Sunnen.
Keyseaters: Mitts & Merrill, Baker, Burr, Davis.
Lappers: Ultralap.
Rivet Hammers: Hi Speed.
Toolmakers Microscope: Gaertner, Bausch & Lomb, Leitz
Tapper: Bakewell #1, #2
Haskins No. 3C, 5CAM.
Welders: Spot & Seam: Thompson, Taylor, Winfield.
Wrapping Roll: #¾ Buffalo

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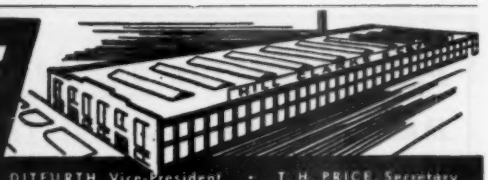

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No. 8 Brown & Sharpe Automatic

DRILLS
No. 150 Baker
No. D8 Colburn, No. 6 Morse Taper
No. 4—B Edlund S.S. No. 3 Taper
No. 1-LMS Leland-Gifford (1942)
No. 2-LMS Leland-Gifford (1942)
No. 4BL Natco 36 Spdl. (1943)

GEAR MACHINES
No. 61-A Fellows Gear Shaper (1942)
No. 71-A Fellows Gear Shaper (1942)
No. 7125 Fellows (1943)
No. 72 Fellows Gear Shaper
No. 16 HS Gould & Eberhardt
No. 12 Gleason Bevel Gear Generator
72" Cincinnati Gear Cutter
No. 3 Barber-Colman Hob Sharpener

BORING MACHINES
No. 31 Lucas 3" bar, M.D.
No. 33 Giddings & Lewis, 3½" Bar
No. 2 Lambert 4" bar
No. 48-B Heald Bore-Matic (1943)
No. 112—C Excello 2 Spdl. (1942)
24" Bullard
36" Bullard
42" Bullard New Era
42" King
60" Colburn, M.D.
72" Niles-Bement-Pond
84" Betts, M.D.

GRINDERS
3"x12" Brown & Sharpe No. 5 (1944)
4"x12" Landis, Model H (1943)
4"x18" Landis, Model H (1942)
6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
10"-14"x36" Norton Type C Plain (1942)
10"x18" Norton Type C Plain (1943)
10"x48" Norton Type C Plain (1943)
16"x96" Landis Type C hydraulic (1942)
Norton Motorized Grinders ranging from 6"x18" to 24"x144"
12"x36" Cincinnati Universal (1945)
No. 5 Bryant Internal Grinder
No. 3 Abrasive Surface Gdr.
No. 34 Abrasive Surface Grinder (1943)
No. 11-16 Blanchard
No. 72-A-3 Heald Internal (1942)
No. 72-A-5 Heald Internal (1942)
No. 16—38 Bryant Internal Gdr.

LATHES
14"x30" Monarch
18"x8' American, Gdr. Head, M.D.
18"x8' American Gd. Hd.
24"x14' American
24"-27"x22' Lodge & Shipley
36"x16' Betts—Bridgeford Grd. Head
36"—48"x16' Lehman Hydratrol (1945)
8"x15" Sundstrand, Model B (1943)
10"x22" Sundstrand, Model AA (1943)
20" Fay Automatics (1942)
Model R-14 Seneca Falls Le-Swing
No. 4 Gisholt Univ. Turret Lathe (1943)
No. 4R Libby, (1942)
No. 1-H Libby, Extra Long Bed (1942)

MILLING MACHINES
No. 2B Milwaukee Plain
No. 4 Cincinnati H.P. plain
No. 5 Cincinnati H.P. Plain
No. 3 Cincinnati Universal
No. 2 Cincinnati Dial Type Vertical (1941)
No. 3 Cincinnati H.P. Vertical
No. 1-18 Cincinnati Mfg. (1942)
No. 2—16" Cincinnati Rise & Fall (1941)
No. 2—16" Sundstrand-Electromil (1942)
No. 3-24 Cincinnati Hydromatic (1943)
No. 4-48 Cincinnati Hyd. Tracer (1942)
No. 45-48 Cin. Hyd. Tracer (1941)
No. 56-72 Cincinnati Hydromatic
No. 56-90 Cincinnati Hydromatic
4½"x12" Pratt & Whit., Model C Thread Mill
6"x36" Lees-Bradner—Model LT (1943)
10"x48" Hanson-Whitney Thread (1942)
12"x24" H.T. Lees-Bradner (1942)
36"x24"x12' Ingersoll Duplex Miller (1946)
48"x24"x12' Ingersoll 4 Hds.
No. 10 Ingersoll 72"x6' Travelling Col. Face Millers (1942)
No. 36—120 Cincinnati Horizontal Hydrotel

MISCELLANEOUS
36" Ohio Shaper
18" Dill Slotter
Micromatic Vertical & Horizontal Hydrohoners

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36"x36"x12' Cincinnati
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50 Ton Henry & Wright Dieing Machine.

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10"x18" Cincinnati Model EA Grinder, serial #5P2A1L-13.

No. 5 Loshbough Jordan B.G.—O.B.I. Punch Press, M.D., 4½" stroke.

1½" Conomatic Automatic Screw Machines, late. (3)

20" Ohio Shaper (1943)

No. 3¾ Bliss S.S. Toggle Press

No. 6 Bliss S.S. Tie Rod

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VERT. MILL—Cinc. Hydrotel 28/60, 4 Spindles, Tracer (1942)
SHEAR, SQUARE—Cinc. 6'x½" Cap. (like new)

AUTOMATIC—Cleveland 1-1/16" x 4 Sp. (1941)
BORING MILLS—D & H 3½" horiz., floor. Vertical Turret Lathe 30".
DRILL PRESS—Minster #2D, 2½" Cap. Hvy.
GEAR SHAPERS—(2) Fellows #6.
GRINDER—Surface, Reid Model 2-I (late)
LATHES—Sebastian 16"x36" Centers
MILLERS—Newton Vert. 42" Rotary Hvy. Cinc. #3 Vert. HI Power. B & Sh. #3 Universal Conradson #3 Pl. Horiz.
PUNCH—Sq. end, Smith 1-1/16" thru ⅞"
ROLLS, BENDING—H & J 30"x¾" Pyr. Southwark 15'x3" Vert.
ROLLS, ANGLE—Bertsch 3"x3"x⅜".
SHEAR—Alligator (#2) 24" blade, 3" Rds. Rotary, Quickwork #50A, 48"x¾" (late)
PRESSES—Z & H #7, 50 ton Percussion. Bliss #8 125 ton, Dbl. action 5" & 2" St. roll feed & Scrap cutter (late)
Bliss #78½, 450 ton, 18" Str.

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#5 Gisholt Universal Turret Lathe, 1943
#1-18 Cincinnati Plain Auto. Mill, 1942
24"x180" Centers Boye & Emmes Lathe, Cone MD
1½" Conomatic 4 Spindle Automatics, 1941 (3)
14"x78" LeBlond Heavy Duty Lathe, 1942
#3B Abrasive, 8"x24" Surface Grinder, 1942

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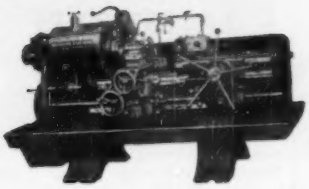
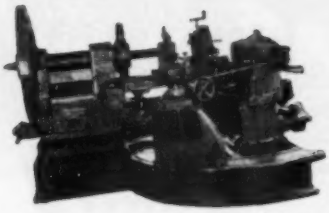
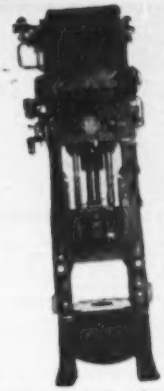


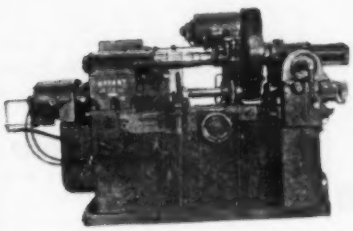
BARDONS & OLIVER #5 Universal Turret Lathe



GLEASON 96" Straight Bevel and Spur Gear Generator



BLISS 75-35 ton Double Action Hydro-Dynamic Drawing Press



BRYANT 16-C-16 Heavy Duty Internal Grinding Machine

BARNES #307 Vertical Spindle 6" Capacity 25" Stroke Honing Machine

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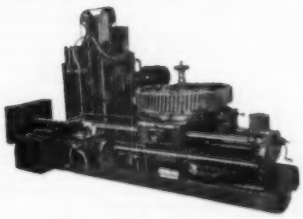
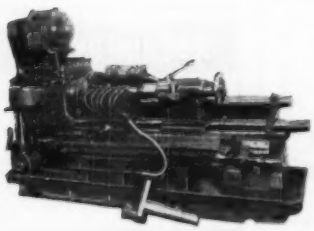
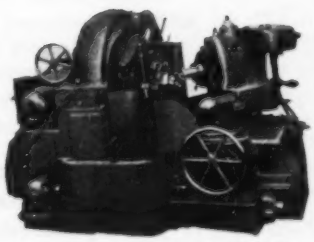


NEWARK #5 72" Capacity Universal Gear Hobbing Machine

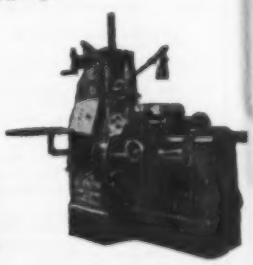
PRATT & WHITNEY 1¾ x 50" Gun Barrel Rifling Machine



JONES & LAMSON "FAY" 20"x25" Centers Automatic Turning Lathe



GLEASON 12" Straight Bevel Gear Generator



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W-165	9 @	.55c	4.95	B-61	9 @	.75c	6.75
W-203	9 @	.60c	5.40	B-135	9 @	.55c	4.95
W-175	9 @	.50c	4.95	B-111	9 @	.75c	6.75
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Reed-Prentice #5 Jig Borer
Hanson-Whitney 10" x 48" Thread Miller
Pratt & Whitney Keller Type "G"
Cincinnati Monoset Tool Grinder
Pratt & Whitney 16" x 30" Model "C" G.H. Lathe
Cincinnati-Gilbert 4' x 11" Column Radial Drill, with 2 side bases and universal box table.

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16"x80" PRATT & WHITNEY Toolroom Lathe
16"x78" HENDEY Toolroom Lathe, taper attachment, 1943
20"/40"x14' RAHN LARMON Sliding Bed Gap Lathe, geared head, taper, 13' centers gap open
No. 4A WARNER & SWASEY Turret Lathe, quick change gearbox, full length leadscrew, 1942
No. 4H LIBBY Turret Lathe, cross sliding turret, 12" hole thru spindle, hardened ways, taper, chucks, June, 1943
Model R-14 SENECA FALLS Lo-Swing Lathe, 40" centers, 1941
4' HAMMOND Jackknife Radial, 1942, electric tapping attachment
84" CONSOLIDATED COLBURN Vert. Boring Mill, 2 swivel heads, rapid traverse, AC—MD
No. 5BM FOSDICK 4 spindle Drill, power feeds to all spindles, No. 3 Morse taper, 1942
42" BULLARD New Era Type Vertical Turret Lathe
84" CONSOLIDATED COLBURN Vert. Boring Mill, 2 swivel heads, rapid traverse, AC—MD
No. 2H KEARNEY & TRECKER Plain, 1942
No. 2H KEARNEY & TRECKER Vertical, power downfeed, 1942
No. 2 CINCINNATI Vertical, dial type, power downfeed to head, rotary table, 1942
No. 3 CINCINNATI Plain Horizontal Dial Type, with Cincinnati vertical head, 1941
No. 4 REED PRENTICE Vertical Milling Machine & Die Sinker, table working surface 24"x84", with 24" rotary table, 1944
No. 3I LUCAS, 3" bar, Horizontal Boring Mill
24" GOULD & EBERHARDT Shaper, rapid traverse, power downfeed, factory, MD
10" PRATT & WHITNEY Vertical Shaper, MD
No. 9A MARVEL Automatic Hacksaw, 10"x10" cap. bar feed, MD
No. 3½ BAKER Keyseater, cuts 4½" keyways, AC-MD

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Sept. 1, 1950

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Lucas #43 Precision, Table Type Boring Mill 5" Bar, Table 36"x72"
Heald No. 49 Borematic, 2 Spindle Hydraulic Cross Table
Fisher, 5" Bar Floor Type Horizontal Boring Mill, AC-DC Drive
Gorton 3L—Three Dimensional Pantograph with Cutter Grinder
Bliss O.B.I. & Double Crank Presses
U. S. Tool Nos. 22, 25, 33 Multi-Slides
WILSON & BAIRD FOURSLIDES

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AUTOMATIC SCREW MACHINE, #00 Brown & Sharpe, Cap. 3/8". Slotting Attachment, Coolant System, etc. TWO.

AUTOMATIC SCREW MACHINE, #2 Brown & Sharpe, Cap. 1". Collet, Collet Chuck, toolposts, Coolant System, etc. FOUR.

AUTOMATIC SCREW MACHINE, #2G Brown & Sharpe, Cap. 1", 2 h.p. 220/440 volts, Collet, Collet Chuck, Coolant System, etc. THREE.

BORING MILL, Bullard 54" Vert. Spiral Drive.

BOREMATIC, Hendu #40 Sgle. End. W/Univ. Fixture. 220/440 volts.

BROACH, Oilgear 10 Tons Horiz. 56" Str.

BROACH, LaPointe #3B, 25,000# 56 Str. 2-speed

BUFFER & POLISHER, U. S. Electrical Multi-Speed Double End #96, 5 h.p., 220 volts, Four Speeds up to 2700 r.p.m. Floor model.

DRILL, Avey-Matic #3 Hvy. 2-Spdl. #3 M.T. 24". 19" C.C.

DRILL, Cincinnati 21" Bard. Drilling & Tapping.

DRILL, Radial, Cincl-Bick. 3' Arm, 9" Col. #4 M.T. 12 speed gearbox. 3 h.p. 3/60/220.

DRILL, Radial, Cincl-Bick. 5' Arm, 13" Col. #5 M.T. 24 speed gearbox. 7½ h.p. 3/60/220.

DRILL, L. Gilfords #2MB 14", 11" C.C. 3-Spdle

DRILL, Baker #314 Hvy. Pattern High Speed Vertical Boring & Drilling Machine, 7½ h.p. 220/440 motor, #5 taper, 12 feeds, 6 speeds, 12½" thrust, 3" Capacity in steel.

DRILL, Leland Gilford #2LMS Upright Sliding Head Two Spindle, #2 taper, 13" overhang, Independent 220 volts, 4-speed motors, indicated spindle speeds.

DRILL, Natco #12 Multiple Spindle Motor Driven, #1 taper, 2 h.p. 220/440 motor, Arranged for 18 spindles, Rectangular head, With Natco 24" Rotary Table.

STRAIGHT BEVEL GEAR GENERATOR 3" Gleason, Serial #18894, NEW—1942, 220/440 volts motors, Gear Cabinet, Full Set of Index Gears, Segments, Auto-Index Attachment, Pneumatic Chuck Equipment, Cutter Setting Gauges & Segment Setting Gauges, Duplete Cutting Cam & Duplete Feed Cam.

PARTIAL LISTING OF LARGEST STOCK IN THIS AREA

BASE PITCH & SPACE MEASURING MACHINE, #337 Illinois, Late Type—Like New. Capacity—12" diameter gear, 12" between centers. Full Set of 0°-Set and Straight Contact Fingers, Dial Indicator, Tailstocks and Leatheretta Cover.

THREAD GRINDER, J & Lamson #TG-615 Automatic, Late Type

GRINDER, Blanchard #16, 28" Chuck Vert Rotary.

GRINDER, Landis Crank 10x32 Hydraulic.

GRINDER, Brown & Sharpe #2 Auto. Horiz. Surface.

GRINDER, Cincinnati #EA, 10" x 36" Hydraulic Cylindrical, Filmatic Bearings, 220 volts motors. Built-in electrics, Hydraulic Infeed.

GRINDER, Covel #78, 8x24 Hydraulic Horiz. Surface.

GRINDER, Norton 6x18 Hydraulic Vert. Rotary Auto. Excello Spdle.

GRINDER, Norton 6x18 Hydraulic Horiz. Surface. Excello Spdl.

GRINDER, Pratt Whitney 22" Vert. Rotary, 84" table travel.

GRINDER, Reid #2-B All-Electric 6x18 Auto. Horiz.

GRINDER, Thompson 6x16 Hydraulic Horiz.

GRINDER, Bath 10"x20" Motor Driven Universal Surface, 220/440 volts motor with centralized push button controls, Internal Grinder Attachment & Steady Rest, etc.

KEYSEATER, Mitts & Merrill #3 Giant Motor Driven, 220/440 volts motor, Capacity—24" long, 3" wide keyway, Automatic Feed.

LATHE, LeBlond 36" x 30', 220/440 motor, 12 speed head, taper attachment, steady rests, etc.

LATHE, Bridgeford 26"x14' G.C.G. 8'3" C.C. 220 volts two speed motor.

LATHE, Hardinge #39 High Speed Sound Operation Machine, 1" Collet Cap, Automatic Collet Mechanism, collets, collet chucks, etc. FOUR.

TURRET LATHE, Bardons & Oliver #7 Universal Grd. Hd. Ram Type. Hydraulic Speed Selector, 2½" Cap. 10 h.p. 220/440 motor, With Chuck, toolholders, etc.

MILLING MACHINE, Van Norman #38P Horiz. 34x12x18. Late Type.

MILLING MACHINE, Vertical Cincinnati #3 N.S. Dial Type. W Rotary Table.

MILLING MACHINE, U. S. #MM1-6 Cam Controlled Automatic Horizontal, #40 taper, Late Type, 220/440 motors, TWO.

MILLING MACHINE, Van Norman #3V Ram Type Vertical, Late Type, 220/440 motors, Also slab arbors, arbor, vise, collets & cutters.

PRESS, Bliss Consolidated 6½" D.B.I. 4" Stro. 220/440 volts. 40 tons.

POWER PRESS, Bliss #84 S.S.S.A. 56 tons, 10" Stroke, 20" between uprights.

POWER PRESS, Bliss #75½ S.S.S.A. 120 tons, 5½" Stroke, 24" between uprights.

POWER PRESS, Bliss #5A S.S. Obls. Crank S.A. Grd. 45 tons, 4" stroke, 30" between uprights.

POWER PRESS, Niagara #3B Bank Flywheel, 87 Tons, 3" stroke, 19" shut hgt. 12"x14" hole thru bed, 36"x18" bed area.

WHEEL PRESS, Niles H & Pond 200 Tons Hydraulic Horizontal, 48" between strain bars, Two Plunger Type, 7.5 h.p. 220/440 motor.

POWER PRESS, Bliss-Consolidated #77 Open Back Gap Frame Sgle. Crank Sgle. Action Back geared. 175 tons, 6" stroke, Bed area—24" x 42", With Roll Feed and Roll Straightener.

POWER PRESS Ferracute #90 Double Crank Sgle. Action, S.S. Geared, 85 tons, 1¾", stroke, Bed area —61½" x 27¾".

POWER PRESS — Bliss - Consolidated #168 - B Straight Side Obls. Crank Single Action, 45 tons, 9" stroke, Bed area—24" x 41", 15 h.p. 220 motor.

SHEAR, 6' to Squaring, Niagara #91268, 10'x¼", Overdriven, 18" Gap, 20 h.p. motor, 220 V. spring hold-down and extra blades.

UNUSUAL VALUES

Milling Machines—No. 1 Universal, No. 1 American (new) plain, No. 1 Vertical.

Drills—Large selection, single and multiple spindles also bench types, many of them new.

Gear Cutters—Brown & Sharpe No. 3—26" Gould & Eberhardt 42".

Grinders—Cylindrical B & S No. 11, Planer type 16"x36" Surface 18"x65", also new (small) Universal bench and floor type. All with coolant, motorized.

Lathes—14"x5', 8', 10'—16"x8', 8', 10'—18"x8', 8', 10'—26"x16'—all cone drive, several motorized also (new) 18"x8' and 10' geared head, motorized.
Large stock 19" and 13" bench and floor type.

Planers—Single head 24"x8', 24"x8', 36"x8'.

Shapers—16", 20", 24" B.G. crank.

Turret Lathes—J & L 2"x24"—9"x36" also Acme, W & S Turret (vertical) boring and facing mills, 5 hole turrets, 30", 40".

SPECIAL—New totally enclosed dust proof, fan cooled ball bearing saw arbor motors, plain shafts to size or threaded, and with collars, measures only 3¼" from center of shaft to flatted top (1 h.p. to 15 h.p.) 3 or 3 phase, 3600 r.p.m.

WOOD WORKING MACHINERY—A very large stock of new and re-built, practically all motorized. New Motorized overhead cut-off and miter saw for wood, plastics, steel, aluminum and other metals. The above list is only a fraction of our stock which changes almost daily, therefore, tell us definitely what you want since we are adding considerable number of machines to our stock which are too many to list. What we have today may be sold tomorrow, so a list is really not dependable.

Drill—Foote-Burt No. 25 24" Ill Duty 3" capacity in steel. Motor attached.

PATTERN MAKING MACHINERY—42"x16' bed wood lathe, compound rest, rack and pinion feed to carriage; 16' heavy duty jointer, extra long bed, front table tilts for giving draft to pattern work; tilting table also tilting arbor rip and cut-off saws; band saws; jointer; floor and bench type trimmers; and also many other machines for pattern work.

THE OSBORNE & SEXTON MACHINERY CO.

P. O. Box 88 Columbus 16, Ohio

LATE MODEL MACHINE TOOLS . .

AUTOMATICS

¾" Cleo Single Spindle.
12"x21" Fay Automatic. 1942.

BOLT MACHINES

No. 509C Manville Thread Roller. Latest.
No. 250C Manville Header, 8868D. Latest.

BORING MACHINES

62" King Vertical. 1942.
48A & 49A Heald Single End. 1942.

DRILLS, RADIAL

6'11" Canedy-Otto. 1942.
615" American Hole Wizard. 1941.

GEAR EQUIPMENT

12" Gleason St. Bevel Gen. 1942.
No. 6 Gleason Bevacycle. 1941.
No. 0 & 17 Gleason Testers. 1942.
6" Red Ring Internal Shaver. Late.
No. GCL Red Ring Shaver. 1942.
No. 545A3, 615A & 61A Fellows. 1944.
No. 72 Fellows 8Shaper. 1943.
Red Ring Univ. Checker.

GRINDERS, CYLINDRICAL

16"x36" Cincinnati Plain. 1942.
12"x30" Landis Univ. 1941.
10"x72" Landis. Plain. 1942.
10"x36" Landis Plain. 1944.
10"x16" Norton Plain. 1943.

GRINDERS, INTERNAL

No. 72A3 & A5 Heald Rotary. 1943.
No. 73 Heald Hydraulic. 1942.

LATHES, ENGINE

27"x96" LeBlond. 1942.
16"x54" American Pacemaker. 1943.
16"x54" Reed-Prentice. 1942.
14"x30" Bradford. 1942.

LATHES, PRODUCTION

No. 3A Lab "Duomatic". 1943.
8"x196" L-Swing Semi. Auto. 1942.
Model 10 Sundstrand. 1942.
14"x42" Monarch "Magna-Matic". 1941.

LATHES, TURRET

42"x36" Bullard Vertical. 1943.
No. 3A Warner & Swasey. 1941.
No. 4A Warner & Swasey. M.D.
No. 1 & 1½"x24" Acme Univ. 1943.
No. 2 & 4 Warner & Swasey. 1942.
No. 3, 5 & 7 Bardons & Oliver. 1942.
No. 3B Gisholt. 1943.
No. 3H Libby. Late.

MILLS, PLAIN

No. 3B Brown & Sharpe. 1941.
No. 5 Cincinnati. 1943.
No. 36 Van Norman. 1942.
No. 28 Van Norman. 1942.

MILLS, PRODUCTION

No. 1-14 & 2-20 Kent Owens. 1942.
No. 1224 Kearney & Trecker. 1942.
No. 3-36 Cincinnati Duplex. R. & F. 1942.
No. 3-36 Cincinnati Hydromatic. 1942.
No. 1-18, 3-18 Cincinnati. 1942.

MILLS, THREAD

12"x34" Lees Bradner. 1943.
6"x30" Lees Bradner. 1942.
4"x9" Hanson Whitney. 1942.

MILLS, UNIVERSAL

No. 2MH Cincinnati. 1942.
No. 2H Milwaukee. 1942.
No. 28U Van Norman. 1943.

MILLS, VERTICAL

No. 3H Milwaukee. 1942.
No. 2 Cincinnati. 1942.

PRESSES

50 Ton Denison. Hyd. Str. 1942.

SAWS

No. 9A Marvel. 1942.
No. 2 Motch & Merryweather. 1944.
8" Porter McLeod. 1942.
No. 401 Campbell Abrasive. 1943.

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rebuilt to give new machine performance

In a spacious plant with precision tools and highly skilled rebuilders. All equipment is tested under power before delivery and carries a 30 day guarantee.

AUTOMATICS

Brown & Sharpe #00 Automatic, Late
4 New Britain #61 1¼" Automatic, Latest
Cleveland 4" SS Model A
Goss & DeLeeuw 7½" 6 Spindle, Latest

GRINDERS

Arter A 1-12" Rotary Surface Grinder, Latest
Jones & Lamson 8"x36" Thread Grinder, Latest
Hammond #8 Type B Carbide Grinder, Latest
Heald #72 A Internal Grinders, Latest
Cincinnati 10"x72" Cyl. Grinder, Latest
Brown & Sharpe #1 Universal Grinder, Latest

BORING MILLS

Bullard 42" Vertical Boring Mill, Latest
Cincinnati 64" Hypro Vertical Boring Mill, Latest
3½" Cincinnati Gilbert Table 42"x80", Latest
Betts 8" Floor Type Horizontal Boring Mill

LATHES

American 24"x7' Engine Lathe
Betts-Bridgeford 36"x8' BC Lathe, Latest
Hendey 24"x72" BC Lathe, Latest
Monarch 20"x46" Engine Lathe, Latest
Reed-Prentice 14"x30" (6' Bed) Lathe, Latest
Wickes 30"x16' Bed Engine Lathe

More complete list furnished on request.
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DRILLS & RADIALS

Allen 6 Spindle Drill Press, Latest
Baker #60 HO 12-Spindle Drill, Latest
4'9" Cincinnati Bickford Radial Drill

SAWS

Do-All V16 Band Saw, Latest
Cochrane-Bly #55 Cold Saw, Latest
Marvel #18 Hydraulic Saw, Latest

For the Best in Machine Tools Call Noll First!

MILLS

Cincinnati #4 Vertical Hi-Power Mill
Hardinge Horizontal & Vertical Mills, Latest
Kearney & Trecker #1H Horizontal Mill, Latest

PRESSES

Toledo #1—½" Press
Bliss #383—½ 35 Ton Punch Press
Ferracute 100 Ton SS Punch Press

MISCELLANEOUS

Ajax 2" Header (Upsetter)
Detroit Tap Grinder, Latest
Colonial VB 10-24 Vertical Broach, Late

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For: Quality and Integrity!!

Fill your Machine Tool Requirements from our large stock. Here are a few representative items.

48"x26' c.c. American "Super Productive," lathes, 2.
10"x20" Monarch EE lathe, taper, collets, '41.
36" Rogers Vert. Turret Lathe, '42.
10"x24" Landis Univ. Grinder, type C, '42.
#34 Abrasive Vert. Surface Grinder, late.
6"x18" Norton Surface Grinder, late.
3" Gleason bevel gr. generator, '42.
#75A Fellows gearshaper, '41.
#2MH Cincinnati Plain Mill, 1941.
#2A Brown and Sharpe Univ. Mill, Timken, M. in base.
16" Gould and Eberhardt Univ. Shaper, 1941.
2—16" x 10' Lodge and Shipley lathes, taper, M. in base.
#45 Giddings and Lewis 4½" horiz. mill.
3" Universal horiz. boring m'c'l.
#2MS Leland Gifford 3 spdle. drill.
#1½ Doeiger and Kirsten alligator shear, '48.

WANTED: Yes, we want good machine tools in any quantity. Call or write us today.

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THE O'BRIEN MACHINERY CO.

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4'9" AMERICAN "Hole Wizard" Radial

18"x30" LODGE & SHIPLEY Selective Geared Head Engine Lathe.

No. 2BL NATCO "Holesteel" Multiple Spindle Drill, rectangular head.

No. ½B P&W Two Spindle Reaming Machine.

Model W-7 BAUSH Hydraulic Multiple Spindle Drills.

20" G&E Industrial Shaper.

No. 4 W&S Ram Type Universal Turret Lathe.

No. 3B B&S Dual Control Plain Miller

No. 145 CLEVELAND Rigid Hobber

No. 12 FELLOWS Gear Shaver

WIGGLESWORTH MACHINERY COMPANY

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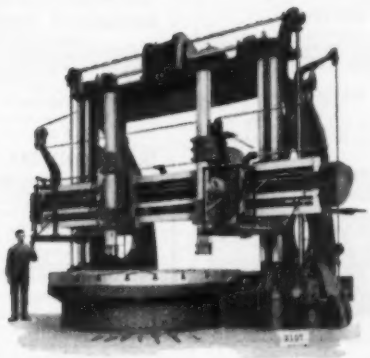

16-FT. NILES-BEMENT-POND Heavy Vertical Boring Mill with 3-way rail, all geared feeds, power rapid traverse, 230 volt variable speed DC motor and control. Inspect at Albany, N. Y.

Philadelphia Representative, Phone—Victor 8-3133
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SIMMONS MACHINE TOOL CORPORATION

MAIN OFFICE AND PLANT 1765 N. BROADWAY, ALBANY, N. Y. NEW YORK OFFICE 50 CHURCH ST.

Cost Savings Start Here!

LATHES

Niles-Bement-Pond 48"x30' centers, quick change gr., gr. hd., heavy duty, AC motor drive, 2 carriages, taper attachment, power rapid traverse, 10 speeds 2.04 to 90 rpm (late type)

Flather 20"x15', M.D. dbl. back gr., QCG, swing 20½", center dist. 11'9".
Bridgeford 38"x50', 15 spd. gr. hd. 38" swing, 48" c.d., mtrzd. carriage
Monarch 20"x72" centers, model "M", 16 spd. gr. hd. 22½" swing, Monarch auto. sizing controls (late)

HORIZONTAL BORING MILLS

Lucas #33, 4½" bar, face plate to outer support 84", #6 Morse taper, A.C. motor drive.
Fisher 5" floor type, vert. travel hd. 98" hor. travel est. 110", platen (very late)
Rochester 3¼" bar, floor type, M.D. horiz., vert. trav. of hd. 41½", horiz. travel column 96", outer support, platen.

VERTICAL BORING MILLS

Bullard 24" and 36" "Spiral Drive", 24", 36" & 42" "New Era" type, vert. 3 jaw and 4 jaw chuck tables.

SHAPERS

Hendey 20" M.D. Crank Shaper
Potter & Johnston 24" M.D. universal crank shaper
G. & E. 24" "Invincible" Plain table, Hi-Duty Crank, M.D.

RADIAL DRILLS

Fosdick 5'12" and 5'15" motor-on-arm "Economax" hydr. #6 taper (very late)

Cincinnati Bickford 5'13", enc. hd. M.D. #5 Morse taper.

GRINDERS

Norton 6"x18", type "C", plain hydr. cylindrical, oscillating spdl. (late)
Norton 10"x18" mech. and 10"x36" hydr. type "C", (late)
Norton #2 Universal hydr. tool & cutter, 1945 machine, complete with M.D. universal workhead and attachments.

GEAR CUTTERS

Fellows #72, M.D. Hi-speed external and internal spur gear shaper, 7" dia. x 1½" face cap. (late)
Gleason 5" M.D. straight bevel gear generator (late)

SCREW MACHINES

Brown & Sharpe #4, 1½" cap. motor in base, auto. collets, change gears and tooling
Acme-Gridley 5", single spindle screw machine, motor driven with tooling

Complete Your Machine Tool Files — Send for Complete Listings

Botwinik Brothers of Mass. Inc.
E. SHERMAN ST. WORCESTER 1, MASS.

MODERN MACHINES

3" Univeral Horizontal Boring Mill
5" Sellers Floor Type Horizontal Boring Mill
42" Bullard New Era Vertical Turret Lathe
6'17" Carlton Radial Drill
8"x48" Jones & Lamson Thread Grinder
#2 Kearney & Trecker Plain Miller

HAZARD BROWNELL MACHINE TOOLS, INC.
350 Waterman St. Providence, R. I.

EVERY ITEM GUARANTEED

All Late Type

54" Bullard Vert. Turret Lathes (2), latest type
5" Giddings & Lewis Boring Mill, #45T with Detroit Universal Duplicator
4" and 6" Sellers Horizontal Boring Mill
3" Universal Horizontal Boring Mills (2)

40"x15' LeBlond Engine Lathe, latest type
Bullard Multaumatics, 16", 12", 8", late
Sgl. Spdl. Cleerman (1949)
Sibley (1941) Drill Presses, #5 M.T.
#28/60 Cincinnati Hydrotel 4 Spdl., '44
9/16", 2¼", 2⅝" RA6 Acme Gridley Auto.
20" Gould & Eberhardt Shaper
Hardinge Multipurpose Chucking Machine, 1950
60" Bickford Vertical Boring Mill
75 Ton Henry & Wright Dialing Press
Kane & Roach 5 Station Roll Former

CHUCKERS

6" 6 Spdl. Acme Gridley and 6" 8 Spdl.
#865 New Britain Chuckers. (3)

PAULS MACHINERY COMPANY
6111 Vermont Ave. — Detroit 8, Mich.
Phone: TYLER 7-6300

FOR SALE

NEW

19—Model 925 New Britain 2 spindle Bullet Core Machine

LATE TYPE MACHINE TOOLS

Krueger-Foodax Automatic
#16 Bryant Grinder
#6-2 Denver Turret Lathe
#2-L Gisholt Turret Lathe
Smalley Thread Miller
#3-A Sundstrand Rigidmil
#12-B Pratt & Whitney Profiler
American Annealing Furnace 66D
#3-24 Cincinnati Miller
#2-18 Cincinnati Rise & Fall Miller

International Machinery Company
HAMILTON, CANADA

No. 3 Abrasive Surface Grinder.
No. 1 W & S Turret Lathe.
P & W 36" Measuring Machine.
14" Model B, P & W Vert. Surface Grinder.

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BROACH, 15T, 42" stroke, V3 Lapointe
DRILLS, 121, 217, 314A, 315, 30H Baker.
GEAR HOBBERS, 8H, 12H, 16HS, 18H G&E.
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GRINDER, No. 34 Abrasive surface.
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HONER, No. 307 Barnes.
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PRESS, No. 61 Cleveland OBI
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Barnes #3 Horiz. 3" Bar
P & H type Horiz., 4" bar
Defiance #6, 4½" bar
Heald #44 Boromatic, 3 heads, LATE TYPE

TURRET LATHES

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Warner & Swasey #1A, Saddle type, New 1941
Warner & Swasey #2, Ram Type, New 1941
Warner & Swasey #2A, Univ.
Warner & Swasey #4, Univ.
J & L 2½"x24" Hartness Flat turret
Acme 2¼"x26" Flat turret
J & L 3½x32 Flat turret
J & L 3"x36" Flat Turret
Gisholt 21"
Gisholt #4 Simplified Ram type, NEW 1942
Foster #7, Geared Head
Simmons #2B Micro Speed Turret Lathe

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American 16"x8' Screw Cutting Engine Lathe
American 18"x6' Geared Head
American 18"x8' Geared Head, Quick change
American 18"x10' Geared Head, 8 speed
American 24"x8' Geared Head, 8 speed
American 24"x10' Geared Head
American 26"x12' Geared Head, 12 speed
American 24"x14' Geared Head, 8 speed
American 30"x12' Geared Head, 12 speed
American 30"x13' Geared Head, 12 speed
Boye & Emmes 18"x8', 3 SCD, DBG
Boye & Emmes 18"x8', 3 SCD, DWA
Boye & Emmes 28"x8', 3 SCD, DBG

BOYE & EMMES 24"x10' centers, NEW 1941

Handy 14"x6', 3 SCD
Handy 16"x6', 4 SCD, SBG
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LeBlond 14"x8', 4 SCD, SBG, Drive all Drive
LeBlond 21"x8', 3 SCD, DBG
LeBlond 24"x10', 3 SCD, FIRST CLASS
LeBlond 27"x20" centers, NEW 1941, EQUAL TO NEW
Lodge & Shipley 14"x30" centers, 12 speed FIRST CLASS
Lodge & Shipley 14"x5', 5 SCD, SG
Lodge & Shipley 14"x8', 3 SCD, DBG
Lodge & Shipley 16"x30" centers, GH, NEW 1942, FIRST CLASS
Lodge & Shipley 16"x8', Selective Geared Head, FIRST CLASS
Lodge & Shipley 18"x6', Geared Head, FIRST CLASS
Lodge & Shipley 18"x8', 5 SCD, SBG
Lodge & Shipley 18"x8', 3 SCD, DBG
Lodge & Shipley 18"x8', Selective Geared Head
Lodge & Shipley 18"x8', Bowl head type, 3 SCD
Lodge & Shipley 18"x10', Patent Head
Lodge & Shipley 20"x8', Geared Head
Lodge & Shipley 20"x10', 5 SCD
Lodge & Shipley 22"x12' centers, Selective Head, 24 speeds
Lodge & Shipley 27"x10', Patent Head
Monarch 14"x6', 3 SCD, DBG
Monarch 16"x6', 8 speed, FIRST CLASS
Monarch 16"x8', 3 SCD, DBG
Niles Timesaver 30"x10' Centers, Double wall apron
Springfield 18"x8', 4 SCD
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11" Reinecker Bevel Spiral & Helical Gear Hobber A.C., M.D.
No. 36 Van Norman Pl. Miller, ram, '43
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30"x120" con. Axelson Lathe, T.A.
30"x120" Hanchett Pianto Surface Grinder
No. 2 Stand. K. & T. Univ. Miller, Timken Gear Cutter, No. 13 B. & S., spur & bevel
12"x48" Hanchett Vert. Spin. Surface Grinder
96"x96"x24' N.S.P. Planer
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18" Gemco Shaper, Univ., 1943
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INDEX OF PRODUCTS ADVERTISED IN THIS ISSUE

Abrasives, Coated.....22, 33, 34, 138
Accessories & Attachments (Machine Tool).....54, 245, 262
Bearings.....21, 184, 193
Books, Technical.....234, 238
Boring, Drilling & Milling Machines (Horizontal).....16-17, 185, 257
Boring Machines Internal.....2nd Cover
Boring & Turning Machines (Vertical).....29, 61
Broaching Machines.....44, 201, 224
Brushes.....237
Castings.....1, 178
Centering Machines.....266
Chucks.....46, 179, 238
Cleaning & Drying Machines & Supplies.....195, 248, 265, 268
Controls, Electrical.....181
Coolant Systems, Filters & Supplies..246
Cut-Off Machines; Sawing Machines...69, 167, 187, 211, 232, 241
Die Castings.....183
Die Making Machines.....180
Dressers, Grinding Wheel.....250
Drilling Machines....30, 48, 52, 73, 86, 92, 133, 136, 159, 185, 187, 188, 219, 241, 246, 252, 256
Electrical Parts & Equipment..43, 184, 270
Electro Plating & Polishing Equipment & Supplies.....269
Engineering & Production Services..78-79, 210
Fabricating Methods & Services..197, 210, 262
Fasteners....182, 186, 212, 215, 233, 234, 266
Gages & Instruments....28, 43, 49, 77, 84, 134, 165, 184, 254, 256, 262, 266, 268
Gear Cutting Machines....5, 8-9, 153, 241
Gears, Speed Reducers, Motor Reducers....153, 175, 193, 225, 240, 241
Gear Testers.....5, 8-9, 153
Grinders—Cutter & Tool.....26, 76, 180, 187, 242, 245
Grinding Machines—Production.....6-7, 14-15, 42, 64, 76, 187, 226, 251, 254, 271
Grinding Wheels.....33, 34, 138
Heads: Drilling, Grinding & Tapping..238
Heat Treating Equipment & Supplies..232, 241, 256, 258
Honing Machines.....74, 229, 254
Hydraulic & Pneumatic Parts & Equipment....171, 177, 179, 230, 273
Jig Borers.....248, 263, 270
Lathes, Automatic.....20, 50, 60, 65, 255
Lathes, Engine..3rd Cover, 23, 50, 55, 62, 228, 234, 275
Lathes, Turret.....19, 20, 60, 72
Lubricants, Cutting Fluids, Quenching Oils & Solvents....2, 59, 170, 191, 192, 235, 245, 248, 266
Marking Machines & Tools.....173, 270
Materials, Cutting & Forming....169, 189, 259, 260, 272
Materials of Manufacture..4th Cover, 18, 38-39, 155, 199, 206, 217, 221, 222-223, 239, 243, 261, 286
Materials Handling Equipment..196, 200, 227, 264, 274
Mechanical Parts & Equipment....74, 245, 246, 264, 266
Millers, Die Sinkers, Profilers..31, 236, 248
Molds.....268
Motors, Electrical..32, 56, 58, 207, 218, 230
Nibbling Machines.....211
Power Transmission..21, 32, 58, 193, 216, 244, 249
Presses, Forging & Forming Equipment & Supplies..24-25, 40-41, 53, 66, 70-71, 80, 94, 161, 202, 248, 253, 262, 264, 267, 268, 270, 288, 292
Production, Inventory & Tool Control.190
Pumps, Circulating.....250
Riveting Machines.....241
Rust Preventives.....191, 192
Safety & Welfare Equipment.....231
Saw Blades.....134, 228, 230
Scales.....198
Screw Machines; Chucking Machines..27, 45, 47, 57, 65, 140, 174, 220
Shapers, Slotters, Keyseaters....88-89, 194, 268
Shop Furniture.....215
Spindles, Machine.....203
Stampings.....74, 266
Swaging Machines.....208
Tapping Machines.....52, 133, 188, 219
Thread Cutting Machines.....12-13
Thread Rolling Machines & Tools....204
Tools, Cutting..10-11, 26, 35, 36-37, 51, 54, 63, 67, 68, 82, 172, 176, 205, 209, 250, 259, 260, 266, 268, 272
Tools, Hand.....213, 246
Transportation.....212
Used & Surplus Equipment.....277-285
Vises.....54, 250
Welding & Cutting, Brazing & Soldering Equipment & Supplies..163, 214, 238, 247, 286, 290

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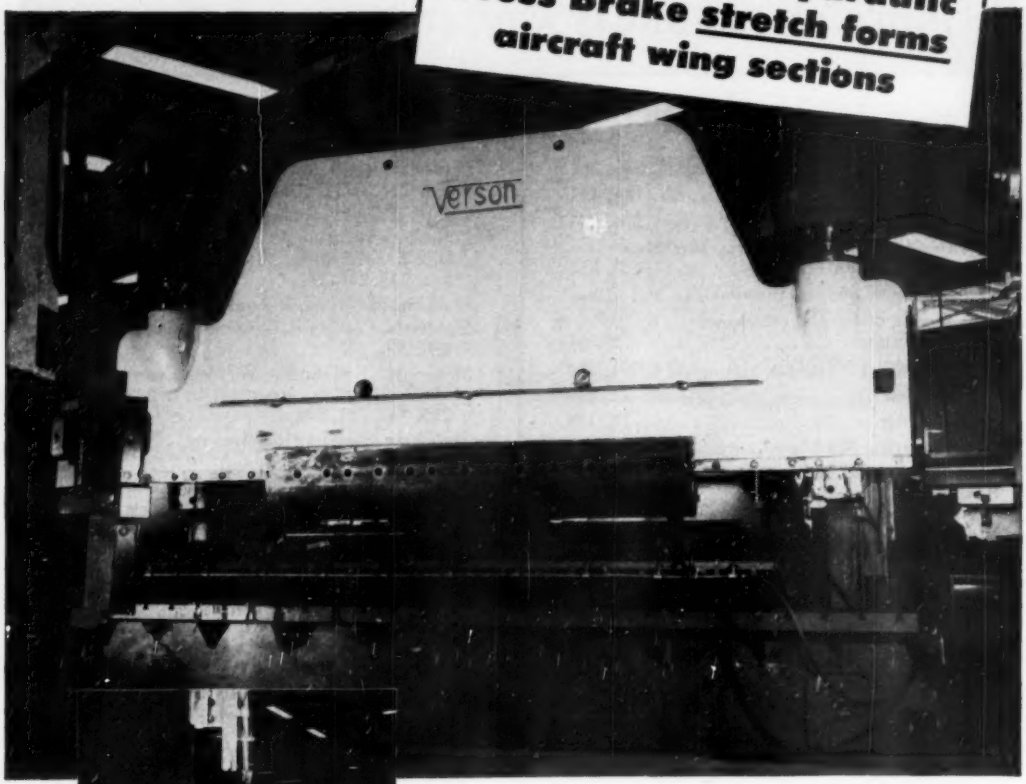

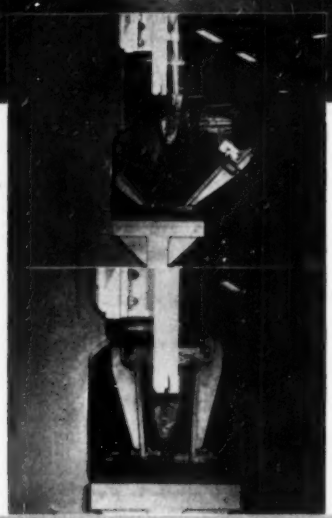

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ADVERTISERS INDEX

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	Page
Abrasive Machine Tool Co.	254
Acromark Co.	270
Air Reduction	290
Alemite	236
Allen Mfg. Co.	186
Allied Products Corp.	262
Allis-Chalmers Mfg. Co.	32, 58
Alvord Polk Tool Co.	268
American Broach & Machine Co.	44
American Chain & Cable Co., Inc.	211
American Optical Co.	231
American Sip Corporation	248
American Steel Foundries, Elmes Engineering Div.	66
American Steel Foundries, King Machine Tool Division	61
American Tool Works	23
Ampco Metal, Inc.	222-223
Antara Products	265
Armstrong Bros. Tool Co.	54
Atlas Chain & Mfg. Co.	244
Automotive Gear Works, Inc.	225
Avey Drilling Machine Co.	30
Axelson Mfg. Co.	228
Barber-Colman Co.	35
Bath Co., Inc., John	209
Baumbach Mfg. Co., E. A.	268
Beatty Machine & Mfg. Co.	202
Behr Manning Corp.	22
Bellows Co.	230
Bethlehem Steel Co.	169
Blake Co., Edward	242
Blanchard Machine Co.	42
Bliss Co., E. W.	53
Blum & Co., Inc., Julius	248
Bodine Corp.	219
Boston Gear Works	193
Brown & Sharpe Mfg. Co.	49
Bryant Chucking Grinder Co.	251
Bryant Machinery & Engrg. Co.	55
Buck Tool Co.	46
Buffalo Forge Co.	246
Bullard Co.	29
Campbell Div., Andrew C., Amer. Chain & Cable Co., Inc.	211
Carboloy Co., Inc., General Tools	36-37
Carlton Machine Tool Co.	86
Carnegie-Illinois Steel Corp.	38-39
Carpenter Steel Co.	189
Carroll & Jamieson Mach. Tool Co.	234
Carter Products Co.	264
Century Electric Co.	207
Cincinnati-Bickford Tool Co.	73
Cincinnati Gear Co.	241
Cincinnati Gilbert Mach. Tool Co.	185
Cincinnati Grinders, Incorporated	6-7
Cincinnati Shaper Co.	94
Clemson Bros., Inc.	228
Cleveland Automatic Mach. Co.	45
Cleveland Crane & Engrg. Co.	161
Cleveland Punch & Shear Works Co.	267
Cleveland Twist Drill Co.	63
Columbia Steel Co.	38-39
Columbus Die Tool & Machine Co.	262
Comtor Co.	256
Cone Automatic Machine Co.	47
Continental Tool Works	82
Cross Co.	133
Crucible Steel Co. of America	18
Cushman Chuck Co.	179
Danly Machine Specialties, Inc.	80
Davis Keyseater Co.	268
Davis & Thompson Co.	252
Dayton Rogers Mfg. Co.	266
Delco Products Div., General Motors Corp.	218
Delta-Rockwell Power Tool Div.	187
Dempster Brothers, Inc.	274
Desmond Stephan Mfg. Co.	250
Dodge Mfg. Corp.	216
DuPont de Nemours & Co., Inc., E. I. Electrochemicals Dept.	59
Earle Gear & Machine Co.	240
Eastern Machine Screw Corp.	268
Eastman Kodak Co.	165
Electric Auto-Lite Co.	183
Elmes Engineering, Div. American Steel Foundries	66
Erickson Tools	273
Errington Mechanical Laboratory	238
Ex-Cell-O Corporation	82
Farrel-Birmingham Co., Inc.	175
Federal Products Corp.	77
Fellows Gear Shaper Co.	8-9
Firth Sterling Steel & Carbide Corp.	259, 260
Foote-Burt Co.	136
Fosdick Machine Tool Co.	48
Frasse & Co., Inc., Peter A.	239
Fulmer Co., C. Allen	254
Gallmeyer & Livingston Co.	226
Ganschow Gear Co.	240
Gardner Machine Co.	64
Garrett Co., Geo. K.	74
General Electric Apparatus Dept.	43, 56
Geometric Tool Co.	67, 68
Giddings & Lewis Machine Tool Co.	16-17
Gisholt Machine Co.	20, 60
Gleason Works	5
Goss & deLeeuw Machine Co.	174
Grant Gear Works	240
Grant Mfg. & Machine Co.	241
Gray Co., G. A.	257
Graymills Corp.	246
Greenfield Tap & Die Corp.	67, 68
Greenlee Brothers	220
Grob Brothers	241
Hamilton Tool Co.	188
Hanchett Manufacturing Co.	245
Hanson Van Winkle Munning, Inc.	269
Hardinge Brothers, Inc.	57
Harnischfeger Corp.	247
Hartford Special Machinery Co.	245
Heald Machine Co.	2nd Cover
Hebert Equipment Co.	266
Hendey Machine Co.	275
Holman Reamer Co.	266
Hones, Inc., Charles A.	241
Hydraulic Press Mfg. Co.	24-25
Illinois Tool Works	205
Index Machine Co.	236
Johnson Gas Appliance	256
Jones & Lamson Machine Co.	72
Jones & Laughlin Steel Corp.	243
Kearney & Trecker Corp.	31
Kennametal Inc.	176
Kester Solder Co.	238
King Machine Tool Div., American Steel Foundries	61
Kitzman Mfg. Co.	268

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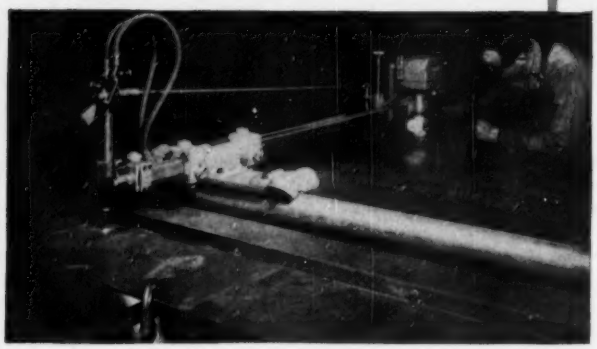

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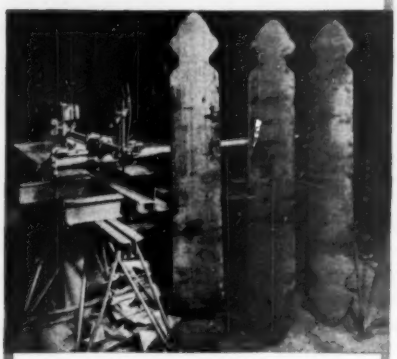
Further, with a cutting area of 32 inches by 56 inches, it gives excellent results in cutting most any steel shape up to 8 inches thick . . . and a 6-foot 8-inch rail can be added, extending the cutting area indefinitely.

This NEW machine is the lowest priced machine of its type in the field (only $695, including a manual tracing device, torch, tip, tubular rail, hose and carrying case). Also, it is portable—the machine itself weighs but 110 lbs. and the tubular rail 35 lbs. The entire unit is packed in a carrying case which can be conveniently handled by two men.



SPECIAL TRIAL OFFER
(Good in Continental U.S.A. Only)

If you would like to try this machine for two weeks *in your own shop on your own work*, just drop a letter to your nearest Airco office or authorized Airco dealer and they will advise you how a shop-trial can be arranged . . . or, if you would like a descriptive folder (ADC-660) they will be glad to send you a copy.

This shows a clevis for a steel mill guide cut from 6" plate—note the smoothness of the cut, reducing considerably machining cost and time.

AIRCO **AIR REDUCTION**
Offices in Principal Cities

Headquarters for Oxygen, Acetylene and Other Gases . . . Calcium Carbide Gas Cutting Machines . . . Gas Welding and Cutting Apparatus and Supplies . . . Arc Welders, Electrodes and Accessories.

ADVERTISERS INDEX

	Page
Kling Bros. Engineering Works	270
Kux Machine Co.	240
L & J Press Corp.	264
Laminated Shim Co., Inc., Shim Div.	182
Landis Machine Co.	12-13
Landis Tool Co.	14-15
LaPointe Machine Tool Co.	201
La Salle Steel Co.	217
LeBlond Machine Tool Co., R. K.	3rd Cover
Leland-Gifford Co.	241
Lincoln Electric Co.	163
Link-Belt Co.	21
Linley Brothers Co.	270
Lodge & Shipley Co.	50
Lubriplate Div. Fiske Bros Refining	170
Luers, J. Milton	266
Magnetic Specialties Corp.	270
Mahon Co., R. C.	197
Mallory & Co., Inc., P. R	286
Manheim Mfg. & Belting Co.	249
Mattison Machine Works	271
McCaskey Register Co.	190
McGraw-Hill Book Co., Inc.	234, 238
Mechanite Metal Corp.	1
Meisel Press Mfg. Co.	240
Metal Carbides Corp.	272
Michigan Tool Co.	153
Micromatic Hone Corp.	75
Miniature Precision Bearings, Inc.	184
Monarch Machine Tool Co.	62
Moore Special Tool Co., Inc.	263
Morris Machine Tool Co.	92
Morse Twist Drill & Machine Co.	10-11
Motch & Merryweather Machy. Co.	167
National Acme Co.	65
National Automatic Tool Co.	52
National Machinery Co.	40-41
National Tool Co.	262
Neise, Karl A.,	268
New Britain Gridley Machine Co.	140
Niagara Machine & Tool Works	70-71
Nicholson File Co.	213
Noble & Westbrook Mfg. Co.	173
Norton Co.	33, 34
Oakite Products Inc.	195
Oilgear Co.	224
Oliver Instrument Co.	180
Optimus Equipment Co.	248
Osborn Mfg. Co.	237
Parker-Kalon Corp.	233
Parker Rust Proof Co.	268
Pawtucket Mfg. Co.	234
Parker Stamp Works Inc.	258
Pope Machinery Corp.	203
Potter & Johnston Co. Sub. Pratt & Whitney Div. Niles-Bement-Pond Co.	25
Pratt & Whitney Div. Niles-Bement-Pond Co.	24
Railway Express, Air Express Div.	212
Reed Rolled Thread Die Co.	204
Republic Steel Corp.	199
Revere Copper & Brass Inc.	155
Rivett Lathe & Grinder Inc.	177
Rockford Machine Tool Co.	88-89
Ruthman Machinery Co.	250
Schrader's Son, A.	171
Sciaky Bros. Inc.	214
Seneca Falls Machine Co.	255
Sheffield Corp.	84
Shore Instrument & Mfg. Co. Inc.	266
Sigourney Tool Co.	256
Simonds Abrasive Co.	138
Smith & Mills Div., Hamilton Thomas Corp.	194
South Bend Lathe Works	159
Springfield Machine Tool Co.	55
Square D Co. (Detroit Div.)	181
Standard Conveyor Co.	196
Standard Electrical Tool Co.	76
Standard Oil Co. (Indiana)	191, 192
Standard Pressed Steel Co.	215
Standard Tool Co.	51
Staples Tool Co.	250
Starrett Co., L. S., The	134
Steelweld Machry. Div., Cleveland Crane & Engineering Co.	161
Sterling Electric Motors Inc.	230
Stewart Warner Corp.	236
Strong Carliale & Hammond Co.	212
Stuart Oil Co., D. A.	266
Sturtevant Co., P. A.	246
Sunnen Products Co	229
Surface Combustion Corp.	232
Sweet's Catalog Service Div., F. W. Dodge Corp.	78-79
Taft-Peirce Mfg. Co.	210
Tennessee Coal, Iron & Railroad Co.	38-39
Texas Co.	2
Thompson & Son Co., Henry G.	230
Timken Roller Bearing Co., Steel & Tube Div.	4th Cover
Toledo Scale Co.	198
Torrington Co.	208
Towmotor Corp.	200
Unitcast Corp.	178
United States Steel Corp.	38-39
United States Steel Export Co.	38-39
United States Steel Supply Co.	38-39, 206
V & O Press Co.	292
Van Huffel Tube Corp.	221
Van Keuren Co.	28
Verson Allsteel Press Co.	288
Vlier Mfg. Co.	266
Wales Strippit Corp.	253
Walker Turner Div., Kearney Trecker Corp.	69
Waltham Machine Works	241
Warner & Swasey Co.	19
Wells Mfg. Co.	232
Wendt-Sonis Company	172
Westinghouse Electric Corp.	184
White & Bagley Co.	245
Wilson Mechanical Instrument Co.	254
Yale & Towne Manufacturing Co.	227
Youngstown Sheet & Tube Co.	261

SEARCHLIGHT SECTION
(Classified Advertising)

EMPLOYMENT	Page
Positions Vacant	276
Position Wanted	276
Selling Opportunities Wanted	276
Employment Service	276
SPECIAL SERVICES	
Contract Work	276
General Pattern Works	276
Stryker Machine Products Co.	276
BUSINESS OPPORTUNITIES	
Wanted	276
EQUIPMENT	
(Used or Surplus New) For Sale	277-285
WANTED	
Equipment	276

ADVERTISERS INDEX

Aaron Machinery Co.	277
Asset Realization Co.	276
Barron Machinery Co.	278
Bennett Machinery Co.	285
Botwinik Bros. of Mass., Inc.	284
BRM Machinery Corp.	284
Brownell, Hazard Machine Tools, Inc.	284
Capitol Machinery Corp.	280
Cincinnati Machinery Co., Inc., The	285
Cook, Joseph M. & Staff	276
Dependable Sales Corp.	276
Dony Machinery Co., D. E.	284
Fairfield Equipment Co.	280
Falk Machinery Co.	281
Hill-Clarke Machinery Co.	278
Hyman & Son, Joseph	284
Indianapolis Machinery & Supply Co.	281
International Machinery Co.	284
J & L Machinery & Supply Co., Inc.	280
Kings County Machinery Exchange	280
Lake Machinery Co.	278
McDonald Machinery Co.	285
Memphis Casting Works, Inc.	284
Messinger Tool Works	280
Miles Machinery Co.	285
Morey Machinery Co.	279
National Machinery Exchange	280
Noll Equipment Co.	252
O'Brien Machinery Co.	283
O'Connell Machinery Co.	280
Osborne & Sexton Machinery Co.	281
Paul's Machinery Co.	284
Rosenkranz, Weisbecker Co.	280
Schupack Supply Co.	280
Simmons Machine Tool Co.	283
West Penn Machinery Co., Inc.	280
Wigglesworth Machinery Co.	278
Winston Machinery Co., Inc.	284

V&O Stockmaster ROLL FEEDS

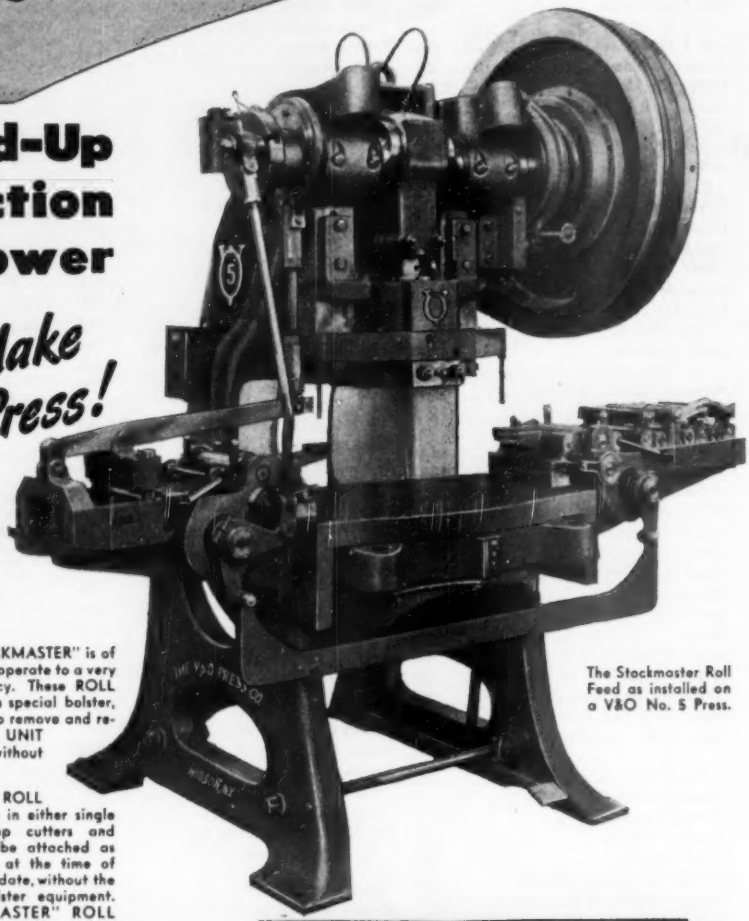
Speed-Up Production and Lower Cost-- on Any Make Punch Press!

V&O "STOCKMASTER" ROLL FEEDS are designed to meet present day needs of feeding material. They are accessible and readily adjustable within capacity to varying lengths of feeds.

The clutch on the "STOCKMASTER" is of the friction type and will operate to a very close degree of accuracy. These ROLL FEEDS are mounted on a special bolster, which makes it possible to remove and replace the ROLL FEED UNIT from and to a PRESS without disturbing its alignment.

In addition to the V&O ROLL FEEDS, which are made in either single or double types, scrap cutters and straightening rolls can be attached as separate items — either at the time of installation or at a later date, without the need of additional bolster equipment. Also, V&O "STOCKMASTER" ROLL FEEDS are adjustable for height.

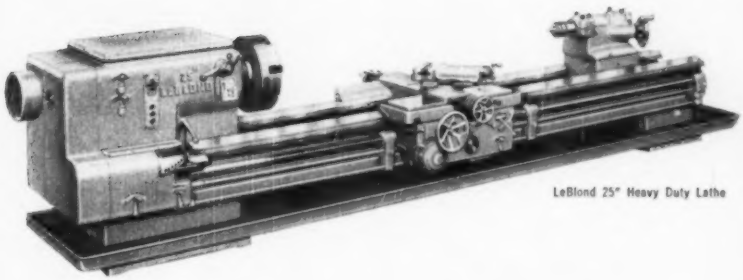
The "STOCKMASTER" FEEDS, as well as V&O STANDARD ROLL FEEDS, are applicable to other makes of PRESSES, as well as those of V&O manufacture. V&O is also prepared to supply STOCKREELS, STOCKCRADLES or other Material Handling devices.. Write for details.



The Stockmaster Roll Feed as installed on a V&O No. 5 Press.

the V&O PRESS COMPANY
DIVISION OF ROCKWELL MANUFACTURING CO.
HUDSON, N.Y.

we mesh fewer gears to give you greater power on...



LeBlond 25" Heavy Duty Lathe

12"
14"
16"
20"
25"
32"

LeBLOND HEAVY DUTY LATHES

No-load Friction HP
20" Heavy Duty Lathe
(20 HP Motor Standard)

LOW RANGE		HIGH RANGE	
Spindle RPM	Friction HP	Spindle RPM	Friction HP
9	.56	18	.75
12	.60	23	.83
16	.64	31	.94
20	.71	39	1.09
26	.49	50	.75
34	.53	66	.83
44	.60	85	1.01
57	.71	110	1.24
71	.68	137	.94
92	.64	178	1.16
119	.71	230	1.50
154	1.05	297	1.91
191	.98	369	1.80
248	1.24	480	2.40
321	1.61	620	3.15
415	2.02	800	4.13

The headstock design of LeBlond Heavy Duty Lathes incorporates the free-running principle, with hardened and ground steel gears.

Result? Fewer gears in mesh at any given spindle speed to minimize no-load friction horsepower. More *smooth* power for your production work. Longer life from your LeBlond Heavy Duty Lathe.

Sixty-three years of machine tool leadership stand behind LeBlond's complete line of 76 lathe models to give you day-in, day-out dependability. Your LeBlond distributor will tell you about our latest models. Call him or write—

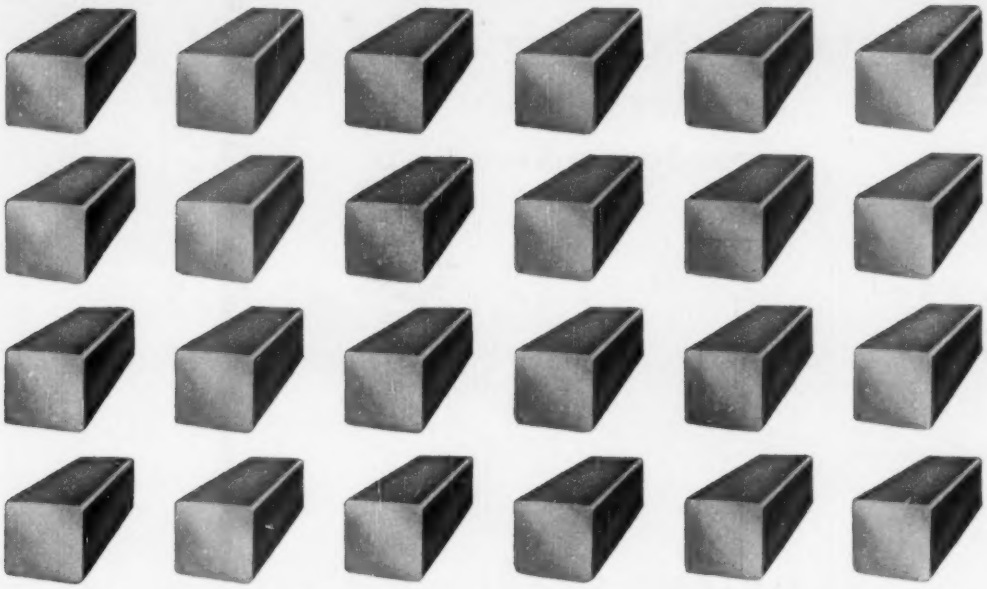
THE R. K. LEBLOND MACHINE TOOL COMPANY
Cincinnati 8, Ohio.

NOTE: *LeBlond also builds huge 40" and 50" Heavy Duty Engine Lathes.*

LeBLOND
Heavy Duty

World's largest builder of a complete line of lathes.

Are all these forging bars the same?



Here's a clue: they're all TIMKEN®

IT doesn't take a metallurgical expert to answer the above question. Not with *that* clue.

You're always sure of uniformity in each analysis of Timken® forging steels—from bar to bar and heat to heat. That's because Timken controls the quality *completely* and *rigidly* through every single step of manufacture.

What do you get out of this? Uniform forgeability, uniform response to heat treatment, uniform physical properties, uniformly superior surface and internal quality, and—as a result—fewer rejects, delays and shop-practice changes.

If you'd like to find out whether you can improve the quality of your forgings, cut production costs, or both—get an "on-the-job" analysis by our Technical Staff. No obligation or charge. And for authoritative, helpful information on forging any one of 67 analyses, write on your letterhead for our book, "Evaluating the Forgeability of Steels". The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing